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ABSTRACTS

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES

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UNITED STATES DEPARTMENT OF THE INTERIOR
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BUREAU OF COMMERCIAL FISHERIES

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0.38 MOLECULAR PROPERTIES OF POST-MORTEM MUSCLE.
1. MYOFIBRILLAR NUCLEOSIDETRIPHOSPHATASE ACTIVITY
OF BOVINE MUSCLE

Goll, Darrel E., and R. M. Robson (Departments of Animal Science, Biochemistry and Biophysics, and Dairy and Food Industry, Iowa State University, Ames 50010)
Journal of Food Science 32, No. 3, 323-329 (May-June 1967)

Post-mortem muscle fibers held isometrically will first develop tension and after 36-48 hr. will gradually lose the ability to develop tension. This tendency is most noticeable in bovine muscle at 2° C. and is closely related to the cold-shortening effect. The authors found it difficult to reconcile the coincident shortening and loss of extensibility of post-mortem muscle with the knowledge of muscle structure and theories of muscle contraction. Therefore, they measured the nucleoside triphosphatase (NTPase) activity of prerigor, rigor, and postrigor myofibrils in an attempt to obtain information on the nature of actin-myosin interaction during rigor. Previous work had shown that actomyosin adenosine triphosphatase (ATPase) is activated by Mg^{++} if trace amounts of Ca^{++} are present, whereas myosin ATPase is inhibited by Mg^{++} under the same conditions.

The NTPase activities of myofibrils isolated from prerigor, rigor, and postrigor bovine semitendinosus and psoas muscles were studied with the following extracting solutions: (1) 0.25M sucrose, 1mM ethylenediaminetetraacetic acid (EDTA), 0.05M tris-(hydroxymethyl)-aminomethane (Tris), pH 7.6; (2) 0.15M KCl,
(over)

 ABSTRACTER: M. F. Tripple

0.6A MICROBIAL SELECTION DUE TO FOOD PROCESSING

Charm, S., and L. Ronsivalli et al.
Food Technology 21, No. 5, 60 ff. (May 1967)

One result of modern methods of processing, packaging, and distributing foods is the changes that occur in the spoilage patterns of the foods. Organisms that have gone unnoticed up to now may make future foods inedible. This "microbial selection," or dominance of a certain species of microflora as a result of some culture condition, is examined in the five papers that constitute this symposium.

Effects of Processing on the Microbial Flora--by S. Charm and L. Ronsivalli; pp. 60, 62, 64. Microbial flora in food may be affected by the changes in temperature, time, radiation, moisture content, pH, salt concentration, or oxygen tension during processing. If the particular process destroys odor-producing, or spoilage-indicator, microorganisms without inhibiting the development of toxic organisms, the normal organoleptic rejection of the product is obstructed and a safety hazard ensues. The authors include graphs illustrating methods of evaluating the margin of safety obtainable by pasteurizing (with irradiation or heat) or dehydrating material in which the size and shape of the material; the time, temperature, and dose rate of processing; and the number, character, and distribution of the microflora vary.

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 ABSTRACTER: L. Baldwin

0.5 SURVEY OF THE U.S. ATLANTIC COAST AND ESTUARIES
FROM KEY LARGO TO STATEN ISLAND
FOR THE PRESENCE OF CLOSTRIDIUM BOTULINUM

Ward, B. Q., B. J. Carroll, E. S. Garrett, and G. B. Reese (Pascagoula Fishery Station, U.S. Bureau of Commercial Fisheries, Pascagoula, Mississippi)
Applied Microbiology 15, No. 4, 964-965 (July 1967)

Completion of the survey of the U.S. Gulf Coast for the presence of Clostridium botulinum left only the section between Key Largo, Florida, and Staten Island, New York, to be examined. Although there is now some general consensus that C. botulinum may be found in any waters where it is diligently sought, the authors felt that the single remaining section of the U.S. coastline should be sampled to obtain definite data.

Fresh to brackish waters were sampled in the upper reaches of tributaries to estuarine systems such as Chesapeake and Delaware Bays. Strictly fresh-water sampling was limited to Lake Okeechobee, Florida. There was never more than 15 miles separating any two sediment sampling stations. Distances between animal collecting points were usually 50 to 70 miles. The animal collections included oysters, squid, clams, crabs, jellyfish, man-o'-war, shrimp, mussels, sponges, starfish, snails, one unidentified gastropod, 21 genera of fin fish, 30 unidentified fish specimens, and 16 combinations of bottom components.

The total number of samples collected was 717, of which 117 animal samples and 177 sediment samples were collected during the winter at the end of cold
(over)

 ABSTRACTER: M. F. Tripple

0.6B MICROBIAL SELECTION DUE TO FOOD PROCESSING

Corlett, Donald A. et al.
Food Technology 21, No. 5, 70 ff. (May 1967)

Microbial Selection Due to Ionizing Radiation--by Donald A. Corlett, Jr.; pp. 70-72, 74. The natural flora of most refrigerated fish consists of a heterogenous population of bacteria, molds, and yeasts. Pseudomonas, because of its ability to grow rapidly at low temperatures, constitutes the largest, most diverse group of bacteria. It is the cause of the putrid, ammonialike odor of spoiled food that has been refrigerated.

Initially, Pseudomonas and Flavobacterium make up 76 percent of the unirradiated population of microorganisms in Dover sole. Following irradiation at 0.1 megarad, neither survives in appreciable numbers. In contrast, the yeasts, the micrococci, and Achromobacter have a degree of radiation resistance--the number of survivors being a function not only of the degree of their resistance to radiation but of the number present before the irradiation process begins. Even highly sensitive Pseudomonas may survive low doses of irradiation if the food irradiated is of low enough quality to contain great numbers of the microorganism.

The microbial selection caused by irradiation always follows the same pattern when a mixed population of microflora is present--the ultimate survivors being dependent on the type of microorganism. The selection process, then, creates a new flora made up of those groups of organisms that can survive irradiation. Spoilage
(over)

 ABSTRACTER: L. Baldwin

MOLECULAR PROPERTIES OF POST-MORTEM MUSCLE

SURVEY OF U.S. ATLANTIC COAST FOR CLOSTRIDIUM BOTULINUM

EFFECT OF PROCESSING ON FOOD MICROFLORA

EFFECT OF PROCESSING ON FOOD MICROFLORA

0.5

weather, and 158 sediment and 265 animal samples were collected during the summer. Only four cultures derived from winter samples produced typical botulinal reactions after being injected into mice, while 11 cultures derived from summer samples were typically positive. Only one or two animal samples were positive in each season. The authors felt only two generalizations would be tenable; (1) oysters, considered to have some inhibitory influences on the development of contaminating C. botulinum, may still conceivably act as vectors under certain circumstances and (2) Type D, which was found in six samples in the Gulf of Mexico, is also found in Atlantic coast animals.

Nine positive tests were obtained from summer sediments--one each of Types A, B, and D, and three each of Types C and E. Of the 158 sediments, one-half were obtained from the North Carolina-South Carolina State line northward and one-half were obtained south of this line. Sediments from the north gave seven positive tests or 9 percent; southern sediments gave only two positive tests or 2.5 percent. Four of the seven northern positive samples were obtained from the western Chespeake area; one was obtained from Lower Bay between the New Jersey northern shore and Staten Island, New York. Six samples were collected about the perimeter of Lower Bay during each season; for each season one of the six produced a toxic culture that could be typed as Types B and C. Four of the five Type E cultures were derived from northern summer samples. It is possible that the higher incidence of botulism in northern waters could be a reflection of population densities around bay systems.

The authors reached a tentative conclusion that the overall incidence of all types of C. botulinum on the Atlantic coast was somewhat lower than that along the Gulf of Mexico; however, this generally favorable picture is marred by concentrations of this organism in several areas.

0.6B

caused by Pseudomonas is readily noticeable when the bacterial count exceeds 1 million per gram, whereas spoilage of fish irradiated in the low-dose range is barely noticeable even when the microbial count reaches 1 billion per gram. [31 references]

Public Health Aspects--by Hans Riemann; pp. 75, 76, 78, 80. During the last few decades, the most outstanding development in the food industry is the amount of food prepared by processors rather than in the home. Foods are kept longer and transported farther than ever before; little time elapses between market trial and distribution; and few products are given large-scale bacteriological tests. The result is a potential health hazard. Evidently a more destructive technique for inhibiting food-poisoning organisms is needed--possibly the proper combination of processing, packaging, and distributing methods.

The canning industry has introduced a nonselective heat treatment that reduces by a factor of 10^{12} Clostridium botulinum spores in low-acid foods. The risk of selecting C. botulinum during ionizing radiation processing may be even greater than during canning, for the spores of these species are among the most resistant of food microorganisms to irradiation. Freezing and lowering the pH causes differential death of microorganisms; nevertheless, freezing and a lowered pH alone will not alter the composition of bacterial flora enough to cause selective growth of food-poisoning organisms after the food is thawed. Lowering the water activity of a food by drying it, curing it, or adding sugar to it could cause the selective growth of Staphylococcus aureus. Yet the selective growth of fungi on dry foods stored in a humid atmosphere is a commonly observed phenomenon.

The author believes that reliance on microbiological standards or total counts as indications of good sanitation and processing conditions tends to increase the risk of food poisoning. Foods containing a mixed microflora are safer than those in which the activity of competing saprophytic flora has been reduced.

0.38

1mM, EDTA, 0.05M Tris, pH 7.6; and (3) 50 percent glycerol, 1mM EDTA, 0.05M Tris, pH 7.6. The muscles were stored at 2° and 16° C.

At 6 hr. post mortem, the Ca^{++}- and Mg^{++}-modified ATPase activities at an ionic strength ($\Gamma/2$) of 0.18 had increased by 20-50 percent over the strength at 0 hr. post mortem. An increase in Ca^{++}-modified ATPase of $\Gamma/2 = 0.52$ was also seen. The Mg^{++}-modified inosinetriphosphatase (ITPase) at $\Gamma/2 = 0.18$ increased with post-mortem time, whereas the Ca^{++}-modified ITPase at the same ionic strength did not change. The Ca^{++}-modified ITPase activity at $\Gamma/2 = 0.52$ increased for the first 24 hr. post mortem; after 312 hr. post mortem, the activity had decreased back to the level at 0 hr. post mortem. No differences in NTPase activities were seen between the semitendinosus and the psoas muscles or between the post-mortem storage at 2° and at 16° C. Use of sucrose or KCl extracting solutions gave the most consistent NTPase results. The low Mg^{++}-modified NTPase activity at $\Gamma/2 = 0.52$ suggested that it would be possible to dissociate thick and thin filaments from rigor muscle through the use of 5mM ATP or ITP. The fact that NTPase activities in the presence of certain modifiers did not change with post-mortem time suggested that the increased NTPase activities did not result from a proteolytic loss of part of the enzyme molecule. The Mg^{++}-modified ATPase activities in the presence of a Ca^{++} chelator indicated that tropomyosin, the most sensitive of the three myofibrillar proteins to proteolytic degradation, had not undergone significant proteolysis after 312 hr. post mortem. [11 references]

0.6A

Selection of Microorganisms Due to Freeze-Drying--by Ignacio S. Pablo, Tony J. Sinskey, and Gerald J. Silverman; pp. 64, 66, 68, 70. Microorganisms in freeze-dried foods are subjected to a series of processes--freezing, submission to vacuum, packaging, heating, storage, and rehydration. During these processes, the microflora are exposed for unequal periods of time to varying amounts of heat, pressure, and moisture. Since the organisms are not equally resistant to identical stresses, microbial spectra will change as the processing progresses.

During freeze-drying, for example, the survival percentage of Staphylococcus aureus, a natural contaminant of shrimp, is quite low, possibly because, being located on the surface of the shrimp, it is subjected to maximal heat and vacuum desiccation. Changes in the storage temperature or in the relative humidity during storage or rehydration further alter the flora. The microfloral spectrum on commercially freeze-dried shrimp rehydrated and stored at 4° C. definitely shifts from mesophilic to psychrotrophic. Gram-negative, oxidase-positive rods that survive drying are reduced during storage to levels of less than 1 percent of the total microbial population. At 4° C., gram-negative, oxidase-positive rods predominate; at 25° C., following rehydration and incubation, only the gram-negative oxidase-negative rods fail to multiply in appreciable numbers. [15 references]

Microbial Considerations of Packaging--by Myron Solberg; pp. 74-75. Of the many kinds of packaging developments introduced after World War II to increase shelf life--films, coatings, deaerators, gas flushers, and high-speed film sealers, for example--one of the most significant is the vacuum package. Because such packages have a high degree of oxygen, carbon dioxide, and moisture impermeability, they may foster microbial growth without presenting the visible means of detecting microbial deterioration formerly available to the consumer. Moreover, by suppressing the aerobic competitors that were initially present, they foster the growth of such strictly anaerobic psychrophiles as the Clostridia. [13 references]

Continued on Card 0.6B.

2.01 BACTERIOLOGY OF SPOILAGE OF FISH MUSCLE.
IV - ROLE OF PROTEIN

Lerke, Peter, Lionel Farber, and Ralph Adams (Seafood and Nutrition Research Laboratory, University of California San Francisco Medical Center, San Francisco 94122)
Applied Microbiology 15, No. 4, 770-776 (July 1967)

While attempting a biochemical characterization of fish-spoilage bacteria, the authors noted that proteolytic ability, as determined by gelatin liquefaction and digestion of egg albumin, was not a constant characteristic of spoilage bacteria and could often be found among nonspoilage bacteria. As a result of this observation, a question arose concerning the importance of proteolysis in fish spoilage--could precipitable protein supply the necessary low-molecular-weight substrates from which spoilage products could be formed through bacteria action? Attempts to find an answer to this question are reported in this article.

Clarified muscle press juice from the English sole (Parophrys vetulus) was fractionated into a protein and a protein-free fraction by gel filtration. Both fractions were inoculated with spoilage bacteria.

The results showed that substances present in the muscle press juice that have a molecular weight greater than 5,000 cannot serve as a substrate for spoilage in the usual sense. The substances of high molecular weight appear to consist mostly of protein; they can serve as an adequate growth substrate for bacteria,

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 ABSTRACTER: M. F. Tripple

2.111 STUDIES ON THE OPTIMUM MESH OF SALMON GILL NET

Konda, Mitsuo (Faculty of Fisheries, Hokkaido University, Hakodate, Japan)
Memoirs of the Faculty of Fisheries, Hokkaido University 14, No. 1-2, 76 pp. (1966)

This card contains a list of the major headings in the article and a table summarizing the more applicable findings.

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 ABSTRACTER: L. Baldwin

2.05 DEMONSTRATION AND ISOLATION OF CLOSTRIDIUM BOTULINUM TYPES FROM WHITEFISH CHUBS COLLECTED AT FISH SMOKING PLANTS OF THE MILWAUKEE AREA

Pace, P. J., E. R. Krumbiegel, R. Angelotti, and H. J. Wisniewski (City Health Department, Milwaukee, Wisconsin 53202; and National Center for Urban and Industrial Health, U.S. Public Health Service, Cincinnati, Ohio)
Applied Microbiology 15, No. 4, 877-884 (July 1967)

The occurrence of Clostridium botulinum Type E in smoked whitefish chubs caught and processed by the Lake Michigan fishery was shown by the outbreak of human botulism in 1963. Types of C. botulinum were found in both mud samples and in the intestinal contents of fish collected from the Great Lakes. The attention of the authors was directed toward whole and eviscerated whitefish chubs (Leucichthys sp.) in the fish-smoking plants in the Milwaukee area. Surveillance studies were begun in September 1964, and from the onset an effort was made to recover C. botulinum from toxic enrichment cultures. This report elaborates on prevalence data and describes the methodology developed for detection of C. botulinum in raw and smoked whitefish chubs. Included are data that corroborate the detection of C. botulinum in toxic enrichment cultures by recovery of toxigenic isolates.

A total of 1,071 whitefish chub samples were examined at the following eight stages of processing: round chubs (1) taken directly from the nets, (2) eviscerated and iced aboard ship, (3) placed in the processors' cooler at 3.3° C. for

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 ABSTRACTER: M. F. Tripple

2.1111 (*) STUDIES ON THE FISHERY OF MACKEREL BY PURSE SEINES IN THE SEA NEAR HOKKAIDO. 5. SOME EXPERIMENTS OF THE REPRESENTATIVE MODEL NETS MADE OF NYLON, URON, AND CREMONA THREAD RESPECTIVELY

Nakamura, Hideo, and Shûzô Igarashi
Bulletin of the Faculty of Fisheries Hokkaido University 18, No. 1, 26-35 (May 1967) (In Japanese, with English summary)

In a previous report, the authors used a model silk net to examine the sinking movement of the net during purse seining, its sinking velocity, and the reduction in its size as it sank. They have now extended that study by using three miniature (1/200th scale) nets made of nylon, uron, and cremona to examine the same variables. All three nets were made so that the differences in their mesh size would have negligible influence on the values obtained for the variables.

The tensile force acting on the purse line during operation was measured with a strain gauge. From the results, the following empirical formula was derived:

$$f/F = 0.7(t/T) + 1.6(t/T)^2 - 1.3(t/T)^3$$

where f is the tensile force at time t; F is the maximum tensile force acting on the purse line; t is the time from the beginning of seining to the point of measurement; and T is the entire seining time. The maximum tensile force acting on the purse line was found to be between 2.2 and 4.5 tons.

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 ABSTRACTER: L. Baldwin

BACTERIAL SPOILAGE OF FISH MUSCLE

INCIDENCE OF CLOSTRIDIUM BOTULINUM IN FISH-SMOKING PLANTS

OPTIMUM MESH SIZES OF SALMON GILL NETS

EFFECTIVITY OF NYLON, URON, AND CREMONA NETS

2.05

4 days, (4) placed in the processors' freezer at -20.6° to -30.6° C. for 7 days, (5) immersed in a brine tank of 40-50 percent salinity for 4 to 16 hours, (6) brined and rinsed in tap water; (7) fresh smoked chubs collected from the smoking racks; and (8) smoked chubs placed in a retail display case at 2.2° to 5.6° C. for 7 to 8 days.

The frequency of C. botulinum contamination of freshly caught and eviscerated whitefish chubs was about 13 to 14 percent. The highest percentage of contamination was 20 percent and was found among chubs sampled at the brining step of processing. The range of contamination among chubs sampled at processing stages prior to the smoking operation was from 6 to 14 percent. In a lot of 858 freshly smoked chubs that had been processed at 82.2° C. for 30 minutes, 10 chubs were found to be contaminated with C. botulinum; one was contaminated with Type B and nine with Type E.

The use of cultures heat-shocked at 60° C. for 15 min. and nonheat-shocked enrichment cultures in combination yielded a greater number of positive samples than either method yielded when used alone. Each toxic enrichment culture obtained was subcultured to isolate the toxigenic organism. Toxigenic pure cultures of C. botulinum were obtained from 80 percent of the fish samples used to produce toxic enrichment cultures. [14 references]

2.1111

Reduction in the size of the net as it sank was proportional to the depth of sinking, as was the case with the silk net used in the previous study.

The sinking time and velocity of the following three parts of the net are tabulated below: (1) center line of the bag net, (2) seam line of the bag net and No. 1 wing net, and (3) seam line of the No. 1 and the No. 2 wing net.

Type of net		Depth in water (cm.)	Mean sinking time (sec.)	Mean sinking velocity (cm./sec.)
Nylon	(1)	50	10.9	4.6
	(2)	49	11.0	4.5
	(3)	49	11.5	4.3
Uron	(1)	50	11.0	4.6
	(2)	49	11.2	4.4
	(3)	50	12.0	4.2
Cremona	(1)	52	7.3	7.1
	(2)	51	7.8	6.5
	(3)	51	7.8	6.6

(Abstract of this article appears under 1.01512 page 1 - February 1967)

Ibrahim, K. H., et al.
Indian Journal of Fisheries 9, Section A, No. 2, pp. 433-869; Section B, No. 2, pp. 91-161 (October 1962)

2.01

but under the action of known spoilage bacteria, they cannot give rise to spoilage products. In the view of the authors, whatever happens in the protein fraction does not constitute spoilage because none of the off-odors commonly associated with spoiled fish appear and there are no volatile-reducing substances and no trimethylamine, which are products repeatedly found to be associated with spoiling muscle or press juice. The authors therefore define spoilage as the production of off-odors, volatile-reducing substances, and trimethylamine and concluded that the nonprotein fraction spoiled and the protein fraction did not.

Does muscle protein play any role in spoilage if it is not a spoilage substrate itself? The results indicated that it does play a role in spoilage because when it was added to the nonprotein fraction it hastened the spoilage. The authors only tried combining the two fractions in a 1:1 ratio; the use of different ratios might provide information on the nature of the substances having the spoilage enhancing effect. Furthermore, the protein fraction contained substances having molecular weights as low as 5,000,so the possibility remains that these substances, being readily utilizable as a growth substrate, could contribute significantly to the overall spoilage process.

The possible effect of autolysis on spoilage would presumably be due to an increased supply of spoilage substrates. The authors define autolysis as the hydrolytic breakdown of proteins and not the breakdown of relatively small peptides. Therefore, the results show that autolysis is very slight at the time spoilage occurs, and even if autolysis were a prominent feature of spoilage, the fragments it would liberate would probably be useless as spoilage substrates. [10 references]

2.111

V. Discussion
  1. Primary elements interfering with capture
  2. General characters of mesh selection
  3. How fish are caught or escape
  4. The optimum mesh size
  5. Grouping salmon for purposes of gill-net fishing
  6. The optimum mesh for each unit group
  7. An inquiry into common commercial mesh sizes

VI. Conclusions

Salmon			Mesh size	
Type	Unit group	Average length	Relative suitability of 3 commonly used nets	Optimum
		(cm.)	(mm.)	(mm.)
Sockeye	3-year olds	48.1	57.5 > 60.5 > 65.0	56.5
	4-year olds	57.1	57.5 < 60.5 < 65.0	69.5
Chum	3-year olds	46.8	57.5 > 60.5 > 65.0	52.0
	4-year olds	53.8	57.5 < 60.5 > 65.0	62.0
	5-year olds	56.4	57.5 < 60.5 < 65.0	65.0
Pink	*caught in mother-ship area	45.5	57.5 > 60.5 > 65.0	52.0
	*caught in small-boat area	44.8	57.5 > 60.5 > 65.0	51.0

*Roughly, the mother ship area extended from 46° N.-55° N. and 160° E.-175° W.; the small-boat area covered the 5 or 6 degrees south of the mother-ship area.

2.114 AUTRONICA STATIC VOLTAGE REGULATORS FOR DC SHUNT GENERATORS

Anonymous
Norwegian Fishing and Maritime News 13, No. 2, 15, 18, 20 (1966)

The modern fishing vessel incorporates a variety of equipment, such as radar, sonar, lights, radio, and different kinds of machinery, all of which require an accurate, reliable supply of electricity. The power supply of a small fishing vessel is normally based on parallel operation between the generators and the batteries. The main engine is used to supply power to the main generator, which operates over a wide variety of revolution speeds and requires some means of automatic voltage regulation, such as the described Norwegian voltage regulator.

The regulator is a static voltage regulator for use with DC shunt generators of the type used on fishing vessels. The manufacturer claims that the device is a pure static regulator and thus has no moving parts; it produces no radio interference; it responds very quickly (0.02 to 0.03 seconds); it regulates voltage to within 1 percent accuracy at a revolution-speed variation of 1:3; and the actual operating efficiency is about 90 percent.

The unit satisfies the basic requirements of a voltage regulator in that it maintains voltage within close limits throughout the entire revolutions per minute range of the engine. Voltage is kept constant from zero to full generator load. The battery is maintained as fully charged as possible and battery "gassing"

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 ABSTRACTER: E. R. Weissman

2.116 TRAWL WARP LOAD METERS

Anonymous
World Fishing 16, No. 4, 21-23 (April 1967)

Measurement of trawl-warp tension has been a part of gear research for many years; however, it was necessary to devise a means of obtaining a constant reading without having to position and remove the measuring gear on each haul. The first commercial application of tension measurement was a trawl winch, which had hydraulic load cells fitted to the band brake anchorages. The cells were connected to recording gear in the wheelhouse. This system gave only comparative readings between the warps because the amount of strain recorded depended on the amount of warp on the barrels. Nevertheless, the system provided valuable information on the behavior of the trawl doors. The winch also incorporated a barrel revolution counter that was intended to assist in leveling the warps.

In an effort to obtain a true reading of the warp load, a system was devised that used strain gauges fitted to an intermediate block hanging between the winch and towing block. Readings were indicated electronically on a single meter in the wheelhouse. An early model used a single indicator that could be read from either port or starboard block; this was later replaced by a twin dial indicator. Two companies have since developed similar versions of commercial warp-load meters. One version incorporates the strain gauges into a separate load cell, with a heavy ring at each end for attachment between suspension point and block. The load-cell

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 ABSTRACTER: M. F. Tripple

2.114 WARP LOADCELLS

Anonymous
Norwegian Fish and Maritime News 13, No. 3, 27 (1966)

The warp load cell is a recent technological development designed to make trawling more efficient. This device is used to measure the load on the warps, or ropes, with which the trawl is towed. The British White Fish Authority fitted two British trawlers with warp load cells for the purpose of testing the unit. The trawlers were equipped with pneumatic brakes on the winches; these vessels were chosen for the trials because the White Fish Authority believes that the combination of warp load cell and pneumatic brakes is the best system presently available for shooting trawls.

The main purpose of the load cell is to aid in shooting and hauling the net. With the load cell, the whole shooting operation may be controlled from the bridge. The captain reads from the load cell meters and directs a crewman who is handling the pneumatic brake controls to maintain a fairly constant load on the warps throughout the shooting operation.

Warp tension must be maintained when the net is hauled, or the net may collapse and be damaged. Winches on trawlers are usually powered by the main engine. The propeller and winches are in opposition when hauling begins, and it is normal practice to haul the net while applying the same power to the propeller that is

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 ABSTRACTER: E. R. Weissman

2.15 BOXING AT SEA: W.F.A. REPORT GIVES DETAILS OF BENEFITS
(*)
Anonymous
World Fishing 16, No. 4, 44-45 (April 1967)

After 4 years of continuous trials and investigations, the British White Fish Authority (WFA) is still in favor of boxing fish at sea aboard British wet-fish trawlers. A newly published booklet by the WFA, "A Progress Report on Trials of Boxing at Sea," states the difficulties and advantages of boxing at sea and is a detailed guide to assist owners in making informed decisions.

The report makes it clear that many of the benefits derived from boxing at sea are imponderable and are related to future developments in the fishing industry. A major unknown factor is fish quality, which was not fully reflected by prices in the trials that did not fit into the general marketing pattern. There is, however, a price improvement when fish are boxed; boxed fish also give an improved fillet yield as compared to shelved or bulk fish.

Of importance is the long-range view that boxing lends itself to the type of development that can be expected in the future. Superchilling, which can extend a voyage by several days, necessitates boxing at sea. Sea trials have shown that boxes are the most practical means of transferring fish from catcher to processing ship or transport. The discharge of fish at market is faster when the fish are

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*Item on back of card.

 ABSTRACTER: M. F. Tripple

STATIC VOLTAGE REGULATOR

MEASURING WARP LOAD

TRAWL WARP LOAD METERS

BOXING FISH AT SEA

Plakarev, A. I., A. K. Kamtarskaya, E. L. Moiseeva, L. V. Ushkalova, L. G. Luk'yantsa, N. V. Ogurechnikova, and G. A. Balandina
Chemical Abstracts 67, No. 5, 20729f (July 31, 1967)

2.114

applied when towing. This use of power results in warp loads that are much higher than necessary for hauling the net safely. Using the information provided by the load cell, it should be possible to reduce towing power or increase speed of hauling without endangering the net.

About two-thirds of the entire British catch of fish comes from bottom trawling. Safety of the net is of major concern in this type of fishing. If the net becomes snagged as it is being towed along the bottom, valuable time may be lost, and the net may be damaged. A powerful, modern trawler tows its net at 2 to 4 knots, therefore some time may elapse after a snag occurs before it becomes apparent. A warp load cell fitted with an overload warning may help avoid costly damage to the net by alerting the ship's captain to a snag shortly after it happens, thus giving him more time to reduce power.

The warps pass from the trawl, over a block on the stern gantry, over a pulley on the mizzen mast, and to the winch. The pulley on the mizzen mast is suspended from the load cell and is positioned so that the angle made by the warp at that point is known. The load cell is of toroidal (ring) design, which allows an axial hole through which the pulley eyebolt passes. The mechanical design of the system is greatly simplified by this feature.

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boxed. Once the boxed fish are landed, it is possible to lay out the boxed catch in sequence of number of days at sea and by size and species. The fish can remain iced in the box until delivery is completed.

From the point of view of the vessel operator, boxing does present problems. One of these problems is fishhold capacity, which, if the fishroom is in the shaped forward section, is limited as far as stacking boxes is concerned. If such a vessel is regularly filling its hold with bulk or shelved fish, the skipper must weigh increased quality against decreased quantity if boxing were used. This problem may solve itself as the side trawler is replaced by the stern trawler with its squared, amidships fishroom. Boxing at sea also requires more labor in the fishroom than bulk stowage does, but the anticipated use of ice blowers and better mechanization, plus increased fishing time and increased overall prices should compensate.

The cost of equipping a vessel with boxes and providing the necessary reserve of boxes ashore is another problem the owner must consider. Against this cost may be balanced the saving in not having to clean the conventional fishroom or the saving in the market, as the boxes would replace the market trunks.

2.114

is avoided. The regulator protects the generator from overload and protects the battery from too high a charging current.

In addition to 12- and 24-volt regulators, the Norwegian firm also manufacturers 110- and 220-volt regulators, which incorporate circuit breakers to protect against voltage surges. All models are claimed to be vibration proof, easy to install, and resistant to harmful atmospheric conditions.

The 12- and 24-volt regulators incorporate a silicon diode reverse current cutout, which is more reliable than the electromagnetic type and which provides greater protection for the regulator. With these regulators, it is possible to have two or more generators in parallel operation, even when the generators are not matched. The current limiter and precise voltage regulation of the unit make such an operation possible. A 24-volt installation regulating three generators in parallel operation is reported to be functioning well after several years of use. The system comprises one 750-watt and one 1,800-watt generator, each powered by its own engine, and a 750-watt generator powered by the main engine. A switchboard circuit for controlling parallel installations is described.

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unit is tested to 14 tons. This unit has the advantage of easy replacement of block or load cell without disturbing the other unit. The wheelhouse indicator unit consists of two dials, each calibrated up to 10 tons. A central control allows presetting of the meters to any required load. If this is exceeded, a warning lamp flashes and an alarm is sounded. Accuracy is within ±3 percent in tons, assuming that the correct angle of 168½ degrees is made by the warp below the suspended load cell block.

The other system uses the same position for the load-sensing block, but the load cell is fitted under compressive load inside the block frame below the crosshead. The cell is hermetically sealed and is quite rigid. Warp load is indicated on twin straight-scale meters in the wheelhouse. The meters can be present at any desired reading to trigger an alarm for overload. The meters are calibrated in fifths of a ton up to 10 tons. Below each dial is a counter on which warp paid out is indicated. Warp paid out is sensed by a proximity switch on each block that transmits a signal for each revolution of the sheave. The signals are converted to feet on the indicators. This system has two inherent weaknesses: (1) as wear occurs on the sheave, reduction of circumference will give a minus reading, and (2) in rough weather there is no quarantee that 100 percent contact between warp and sheave will be maintained. With intelligent use, however, this system will give comparative readings and act as a check on brake slippage.

2.9 (*) GROWTH AND TOXICITY OF A MARINE DINOFLAGELLATE, GONYAULAX TAMARENSIS

Prakash, A. (Fisheries Research Board of Canada Atlantic Oceanographic Group, Bedford Institute of Oceanography, Dartmouth, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 7, 1589-1606 (July 1967)

Basing her conclusions on a quantitative relation between the rise in shellfish toxicity and the abundance of Gonyaulax tamarensis in the Bay of Fundy, Needler (1949) suggested that this marine dinoflagellate is the causative agent. The present author extended the analysis by isolating unialgal cultures of G. tamarensis and studying their growth and toxigenic characteristics.

The organism grows in water ranging in salinity from 7 to 40°/$_{oo}$; optimum growth is at 19-20°/$_{oo}$. It grows in waters ranging in temperature from 5° to 25° C., with the optimum growth occurring in waters between 15° and 19° C. Correlating these data with known facts about the range of salinity and temperature in the Bay of Fundy, the author concluded that salinity is more important than temperature in controlling the growth of G. tamarensis. This conclusion agrees with Wood's (1965): in oceanic environments, the distribution of dinoflagellates is largely controlled by temperature, whereas, in coastal and estuarine environments, it is controlled by salinity.

During early growth of the culture, toxin is scarcely detectable until cell density reaches about 5 x 10^3 cells per milliliter. Beyond that point, toxicity

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 ABSTRACTER: L. Baldwin

3.12 THE EFFECT OF TYLOSIN LACTATE ON THE SHELF LIFE OF SEMIPRESERVED HERRING FILLETS ('TITBITS')

Erichsen, Inger (Swedish Institute for Food Preservation Research, Göteborg, Sweden)
Journal of Food Technology 2, No. 1, 61-68 (March 1967)

According to Erichsen et al. (1962), hexamethylene-tetramine alone or in combination with benzoic acid are the only preservatives that can prolong the shelf life of semipreserved fish products. The highest amount of each preservative allowed in Sweden when added separately to foods is 0.2 percent benzoic acid or 0.05 percent hexamethylene-tetramine. When the two preservatives are added in combination, the sum of the relative amounts of each ingredient must not exceed 100.

Public health authorities have objected to the use of hexamethylene-tetramine as a preservative because of possible toxic effects. Hexamethylene-tetramine has been prohibited for use as a food preservative in Germany where refrigeration is the only method that can be relied on to increase the keeping quality of semipreserved fish products.

An investigation was begun to find a preservative that could be used as a substitute for hexamethylene-tetramine in preventing gas formation and the deterioration of semipreserved food products by heterofermentative lactobacilli. Tylosin lactate was considered to be of potential value for these purposes. Tylosin lactate is known to be particularly effective against gram-positive bacteria,

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 ABSTRACTER: M. F. Tripple

3.15 CHEMICAL PRESERVATIVES IN FOODSTUFFS. VI - THE EFFECT OF SILVER IONS ON MICROBES, IN PARTICULAR ON THE FLORA OF FRESH FISH

Nikkilä, Olavi E., Alpo Siiriä, and Jorma J. Laine (The State Institute for Technical Research, Laboratory for Food Research and Technology, Otaniemi, Finland)
Journal of the Scientific Agricultural Society of Finland 38, pp. 198-209 (1966)

Silver possesses an oligodynamic effect--that is, even in small concentrations it exerts either a microbistatic or a microbicidic influence. Presumably the silver ions denature the protein part of the enzymes in the microbial cell. When either silver salt or metallic silver is present in water at concentrations of from 0.02 to 0.03 p.p.m., its bactericidal effect is claimed to be 40 times greater than that produced by chlorine treatment. At such concentrations, it is not toxic to humans and animals. Research indicates that silver-treated water, when used for washing food products and their containers, could give the product a longer shelf life. Also, ice or snow containing silver ions could preserve fish against decomposition better than ordinary ice does.

The present study was concerned with the microbicidic effect of silver ions upon different microbial cultures in water and with the keeping quality of fresh Baltic herring (Clupea harengus var. membranus) that had been stored in ice containing silver ions. The authors' purpose was to discover applications for silver ions that would aid the food industry in preventing microbial attacks.

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 ABSTRACTER: M. F. Tripple

3.18 (*) ONE-TWO PUNCH CONTROLS PROCESSING ODORS

Gelber, Paul
Food Processing and Marketing 28, No. 5, 80-81 (May 1967)

Water scrubbers are used to control air pollution at fish-processing plants, but the scrubbers may become rusted and corroded after many years of contact with the sea water used in the scrubbing process. Worn-out scrubbers will no longer reduce offensive odors from a fish-processing plant to a satisfactory level. A fish-processing plant, however, has solved both the problem of reducing the level of odor efficiently and the problem of replacing worn-out scrubbers.

Ozone chemically oxidizes odors in noncondensible gases, and the use of this gas in a scrubber installation has considerably reduced air pollution from the fish-processing plant. The scrubbers are fabricated with polyester fiberglass to guard against the corrosive effect of sea water. The plant uses a process that converts menhaden into fish meal and fish oil at 100 tons per hour. The scrubbers and the ozone treatment are used during the cooking and drying stages of the process in which release of obnoxious odors is particularly offensive. Only scrubbers are used during the polishing operation when oil is removed from water by centrifugation and odors are not as offensive. A closed system is used during the final stage of process when the solids are concentrated by evaporation, and neither water scrubbing nor the ozone treatment is required.

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 ABSTRACTER: M. M. Gwin

3.12

to be stable at high salt concentrations, and to provide its best effect under acid conditions.

The raw material used in the investigation was Icelandic herring (Clupea harengus) packed in a sugar-salt brine and allowed to mature before being canned in a pickle solution. Samples of semipreserved herring were selected from two factories to allow a comparison. The following experimental conditions were used: (1) herring packed without any preservatives to serve as controls; (2) commercial packs of herring containing a mixture of benzoic acid and hexamethylene-tetramine in the pickle solution; (3) herring with 10 p.p.m. tylosin added to the pickle solution; (4) herring with 20 p.p.m. tylosin added; and (5) herring with 40 p.p.m. tylosin added.

Comparison of samples packed with hexamethylene-tetramine plus benzoic acid and samples packed with added tylosin showed a better keeping quality for the samples packed with tylosin. The first sign of gas production for samples packed with hexamethylene-tetramine occurred after 6 weeks, and for samples packed with 20 p.p.m. tylosin it occurred after 10 and 17 weeks at 20° C. for the two factories.

Visible gas formation started in the control samples after 3 and 4 weeks at 20° C. Samples with 20 p.p.m. tylosin added had an increased storage time at 20° C. of 4 to 10 weeks as compared with samples preserved with a mixture of hexamethylene-tetramine and benzoic acid. Analysis of the stability of tylosin during storage indicated that an initial rapid decrease in activity was followed by stabilization at a level where the tylosin remained active for a considerable period of time. The results of the storage tests showed that visible gas formation might have occurred when tylosin had decreased to a level of about 1.5-2 p.p.m. in the pickle solution and 3.5-7 p.p.m. in the fish.

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Vapors from the fish processing are routed to the scrubbing towers into which 700 gallons per hour of sea water is sprayed through a nozzle that provides the proper spray angle for maximum scrubbing efficiency. The sea water cools the incoming gases, condenses the condensible gases, and entrains any particles. Non-condensible gases that escape up the stack with the cleansed air are oxidized by the ozone, which is injected into the stack. After 10 years of service, the 36-inch-diameter scrubbers show no signs of salt-water corrosion. Residents of the area around the plant are no longer annoyed by air pollution from the plant.

3.18 NEW ORGANIC WASTE DIGESTERS SANITIZE AND REDUCE ODOUR

Anonymous
Fd. Can. 26, No. 11, 52 (1966)
Abstracts from Current Scientific and Technical Literature 20, No. 5, Abstract No. 1110 (May 1967)

Compositions are described that will digest waste at sanitary sewage disposal plants, digest organic waste and reduce odor at sewage lagoons, digest wastes from creameries and from cheese and butter factories, liquefy organic matter in the drain lines of food-processing plants, and liquefy and deodorize vegetable and animal matter.

2.9

becomes a function of cell density. It may be described by the equation: $y = aX + bX^2$, where y is cell density, X is the toxin yield in micrograms, and a and b are constants. Bacteria play no direct role in the production of toxin, though they may influence it by promoting the growth of the dinoflagellate. G. tamarensis cultures, like those of G. catenella, progressively lose their toxin when they become old, die, and release the toxin into the surrounding medium by lysing of the cells. G. tamarensis, however, is from 5 to 10 times more toxic than G. catenella. [35 references]

2.9 EFFECTS OF TETRODOTOXIN ON EXCITABILITY OF SQUID GIANT AXONS IN SODIUM-FREE MEDIA

Watanabe, Akira (Tokyo Medical and Dental University, Tokyo, Japan), and Ichiji Tasaki, Irwin Singer, and Lawrence Lerman (National Institutes of Mental Health, Bethesda, Maryland 20014)
Science 155, No. 3758, 95-97 (January 6, 1967)

Tetrodotoxin is a potent poison occurring in the Japanese pufferfish and the California newt. The effect of tetrodotoxin on the excitability of internally perfused giant axons of squid covered with various sodium-free media was studied. Action potentials were suppressed by tetrodotoxin, with or without the sodium ion in the external medium. Tetrodotoxin suppressed the action potentials produced in media containing salts of only the divalent cations $CaCl_2$, $CaBr_2$, $SrCl_2$, or $BaCl_2$. These findings on the action of tetrodotoxin do not support the separate-channel hypothesis for excitable membranes. [15 references] [Abstracter: M. M. Gwin]

3.15

Saccharomyces cerevisiae, Escherichia coli, and naturally mixed flora were subjected to four kinds of silver-ion treatment with the following results:

1. Adding water containing various concentrations of silver ions to water in which the microorganisms were suspended showed that S. cerevisiae was more sensitive to silver ions than was E. coli and that the natural mixed culture was quite resistant to the silver ions.

2. Using silver-ion water to rinse glass bottles contaminated with a cell suspension of S. cerevisiae showed that the microbial counts did not differ significantly from the control counts and that inordinately long contact times were required to effect any reduction in the number of microbes present.

3. Using silver-ion water to fill stainless-steel pipes that had been contaminated with S. cerevisiae and E. coli and washed with sterile water again showed that S. cerevisiae was less resistant to the microbicidic action of silver than E. coli and that the natural mixed culture was not affected by this treatment. The microbicidic action of the silver ions was reduced during the course of the experiment.

4. Storing Baltic herring in ice made of silver-ion-containing water did not improve the keeping quality of the herring. Although the silver ions did not kill the organisms when they were living on the surface of the fish, these ions were quite effective against the same organisms in water.

The authors concluded that microbes themselves can be destroyed by silver ions in aqueous solutions, but that silver ions become less effective when the microbes are protected by a natural environment.

3.2349 ECONOMIC EVALUATION OF UHF DIELECTRIC VS. RADIANT HEATING FOR FREEZE-DRYING

Hammond, Leigh H. (Department of Economics, North Carolina State University, Raleigh)
Food Technology 21, No. 5, 51-52, 58-59 (May 1967)

Usually shrimp are freeze-dried by radiant heat, an operation that involves a rather lengthy drying cycle. Hoover et al. (1966) have suggested that using an ultrahigh frequency (UHF) system will accelerate the drying time. The author of the present article has compared the total costs of the two systems to determine the economic feasibility of replacing the usual technique with a new one. He used the costs of freeze-drying chopped beef patties, whole cooked shrimp, and loose green peas for the comparison. The charts below summarize his findings about shrimp. The figures are based on three basic assumptions: (1) the work year encompasses a 24-hr. day, a 5-day week, and a 50-week season; (2) the drying cycle takes 3 hr. (2.32 hr. actual drying time) for the UHF method and 8 hr. (6.96 hr. actual drying time) for the radiant-heat method; (3) shelves can be loaded to 8 lb. per square foot during UHF operations and to 2-2.5 lb. per sq. ft. during radiant-heat operations. His UHF system was operated at 915 mc.

Plant size (based on annual volume of frozen shrimp)	Total costs for operation by		Radiant costs relative to UHF costs (in %)
	UHF	Radiant heat	
A (1,000,000 lb. per yr.)	$137,800,000	$ 148,900,000	108
B (10,000,000 lb. per yr.)	973,400,000	1,180,600,000	121
C (30,000,000 lb. per yr.)	2,434,600,000	3,231,000,000	133

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 ABSTRACTER: L. Baldwin

3.239 NATURE AND ORIENTATION OF ICE IN FROZEN FISH
(*)

Aitken, A. (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 1, No. 1, 17-24 (March 1966)

Some of the water in biological materials is tightly bound to proteins or carbohydrates and is not readily frozen or removed by drying. However, some of this water can be irreversibly unbound by freezing to low temperatures. The less strongly bound, readily frozen water has been studied in regard to its location in the tissue. In general, this study deals with the nature of this ice in frozen fish muscle.

It has been suggested that discrepancies between observed and computed specific heats of fish tissue may be a consequence of the formation of vitreous ice instead of the common hexagonal modification. In gelatin gels, the three polymorphic forms of ice stable at atmospheric pressure--hexagonal, cubic, and vitreous--can all be formed, depending on the gelatin concentration and the rate of freezing. Conditions of formation of these structural modifications in pure water have been studied and their structures have been reviewed. It has been argued that in rapidly frozen gelatin gels the formation of cubic ice does not need to be postulated; all X-ray diffraction patterns may be attributed to mixtures of vitreous ice with hexagonal ice of specific habit. The present study was initiated to determine whether the formation of a less common form of ice might explain the unusual dielectric properties of frozen fish found by other researchers.

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 ABSTRACTER: M. F. Tripple

3.239 FREEZE-DRYING OF ATLANTIC COD STEAKS

Legendre, R. (Fisheries Research Board of Canada Technological Station, Grande Rivière, Quebec) and A. L. Wood (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 7, 1461-1473 (July 1967)

Fish, which has a soft, tender, moist texture when fresh, becomes coarser, tougher, and drier when freeze dried. Several causes have been suggested for the change--alterations in actin and myosin cause textural deterioration, and transformation of water from the liquid to the solid state and its removal as vapor cause physical and chemical damage to the product. The authors of the present paper have investigated the nature of the changes in relation to the rate of sublimation and the quality of the finished fish product.

Using two types of drying equipment, they examined cod steaks taken from fish caught between March and October in inshore Atlantic waters. Cod steaks were used because the muscle fibers, being roughly perpendicular to the long dimensions of the sample, permit water vapor to escape more readily than do those of fillets; moreoever, steaks can be cut to a variety of thicknesses without changing their shape or structure. Samples from 6 to 16 mm. thick were taken from male and female cod and subjected to a variety of treatments: quick frozen or slow frozen, in prerigor or postrigor conditions, under dryer pressures of from 20 to 2,000 μ; sample temperatures ranged from 35° to 125° C. The freeze-dried steaks were reconstituted by being immersed in distilled water at room

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 ABSTRACTER: L. Baldwin

3.2495 PROTECTIVE EFFECT OF α-TOCOPHEROL ON THE SOLUBILITY
(*) OF ACTOMYOSIN FROM YELLOWTAIL MUSCLE

Ikeda, Shizunori, and Takeshi Taguchi (Department of Fisheries, Kyoto University, Maizuru, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 6, 567-571 (June 1967) (In English)

In a previous paper (1966), the authors reported that the loss of tocopherol, one of the most important of the natural antioxidants, was proportional to the increase of lipid peroxides in frozen-stored fish tissue. In the present paper, they investigated the effect of α-tocopherol on the solubility of actomyosin in the presence of unsaturated fatty acid. Thereby, they hoped to learn the effect of tocopherol on the quality of fish muscle and to find some factor that could be related to the stability of fish muscle protein during storage.

Actomyosin prepared from the muscle of yellowtail (Seriola quinqueradiata Temminck and Schlegel) was centrifuged, and the supernatants were used for a determination of the solubility of the actomyosin. Unsaturated fatty acid was added, and the content of protein nitrogen was determined. Lipid peroxide formed from the unsaturated fatty acid was tested by a thiobarbituric acid (TBA) test derived from the method of Ottolenghi (1959). Linoleic acid was added to the actomyosin solutions, and the resulting mixture was stored for 4 days at 2° C. To determine whether the insolubilization of actomyosin during storage was caused

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 ABSTRACTER: L. Baldwin

FREEZE-DRYING SHRIMP BY UHF AND RADIANT-HEAT SYSTEMS

FREEZE-DRYING OF COD

NATURE OF ICE IN FROZEN FISH

EFFECT OF α-TOCOPHEROL ON COLD-STORED FISH MUSCLE

3.239

temperature and baked without seasoning for 5 min. per 7-mm. thickness at 260° C. Fresh cod and cod that had been frozen were also baked and presented as controls to the taste panel that judged the freeze-dried steaks.

Measurements made during processing showed that drying time varies directly with the thickness of the steak but inversely with the surface temperature of the sample. Total pressure within the dryer does not affect the drying time of the thinner steaks, but it will vary inversely with the drying time and the drying rate of steaks 12 mm. thick. The total drying time for steaks 16 mm. thick was the same whether they came from prerigor or postrigor, quick-frozen or slow-frozen fish. Steaks 6 mm. thick from cod frozen prerigor, however, took about 25 percent longer to dry than those from cod frozen postrigor.

Evaluation by the taste panel revealed that the quality of the steaks varied inversely with their thickness and their surface temperature; it was not affected by dryer pressure. Only the slow-frozen steaks from postrigor cod were consistently judged to be of a quality below that demanded by the consumer. The sex of the fish from which the sample was cut had no effect on either the drying rate or the overall quality of the steak.

Postrigor 6-mm. steaks regained 90 percent of their original water content after 25 min. immersion in water; prerigor 6-mm. steaks required 75 min. to regain 90 percent of their original water when slow frozen and 80 percent of their water when quick frozen. Thicker (12 to 16 mm.) prerigor steaks reconstituted more slowly, some interior sections being still dry after 2 hr. [13 references]

3.2495

by peroxide from unsaturated fatty acid, the authors studied the correlation between the solubility of the actomyosin and the TBA value of the actomyosin solutions.

The solubility of actomyosin decreased proportionally with the increase in TBA value. The authors speculated that, if the insolubilization of actomyosin were caused by peroxide from the unsaturated fatty acid, it might be prevented by the addition of α-tocopherol. So they added α-tocopherol. The addition caused the increase in TBA values to diminish considerably but had little effect on the solubility of the actomyosin. On the other hand, the actomyosin was markedly stable when α-tocopherol was present and fatty acid was absent. This stability led to the assumption that lipids in the actomyosin preparation might have caused the α-tocopherol to have a protective effect on the stability of the actomyosin.

Chromatograms of an ethanolic extract of actomyosin preparation contained one spot having an R_f value of 0.7, which corresponds to that of lecithin. Assuming that the lecithin was a factor in the stability of the actomyosin, the authors concluded that the solubility of the actomyosin was preserved by the interaction of lecithin and α-tocopherol.

3.2495 THE RELATION BETWEEN THE TOUGHNESS OF COD STORED AT -29° C. AND ITS MUSCLE PROTEIN SOLUBILITY AND pH

Cowie, W. P., and W. T. Little (Unilever Res. Lab., Aberdeen, Scotland)
Chemical Abstracts 66, No. 17, 75064v (April 24, 1967)

3.2349

Breakdown of costs for freeze-drying in Plant B

Cost component	Costs of operating by	
	UHF method	Radiant-heat method
Fixed		
Freeze-drying equipment	$146,900,000	$ 746,500,000
Refrigeration	396,000,000	345,600,000
Electronic equipment	397,500,000	- - -
Total equipment	940,400,000	1,092,100,000
Buildings	33,000,000	88,500,000
Total equipment and buildings	973,400,000	1,180,600,000
Annual fixed expenses (machinery, depreciation, interest, taxes, repairs, insurance)	153,100,000	181,800,000
Variable		
Utilities	158,300,000	61,600,000
Labor	51,700,000	75,700,000
Maintenance	21,900,000	30,800,000
Tube replacement	22,500,000	- - -
Total annual cost	254,400,000	168,100,000

3.239

A specimen cut from commercially frozen fish gave an X-ray pattern clearly that of the common hexagonal modification, which is thermodynamically stable at -60° C., though the relative intensities of the reflections differed somewhat from those of pure hexagonal ice. The author suspected that this difference was due to some degree of preferred crystallographic orientation of the ice crystals, which could be caused either by the high degree of orientation of the muscle fibers and their components, or by the possible directional nature of freezing, or both. The combinations of fiber direction and freezing direction were therefore examined.

Two characteristic diffraction patterns were obtained and labeled Type I and II. These patterns were clearly related to the hexagonal patterns obtained by researchers. There was some variation from sample to sample in the degree of orientation, but the differentiation into the two types was always clear. It was obvious that the direction of freezing had the predominant influence on the pattern obtained. For a given freezing direction, the slight differences in X-ray pattern between replicate samples with the same fiber direction were comparable to those between samples of different fiber directions. Fiber direction thus has no substantial effect on the crystalline orientation.

3.239 THE OCCURRENCE OF RIBOSE 1-PHOSPHATE AND FRUCTOSE 1-PHOSPHATE IN COD MUSCLE POSTMORTEM

Jones, N. R., and J. R. Burt (Torry Res. Sta., Aberdeen, Scotland)
Chemical Abstracts 64, 16530h (May 23, 1966)

TOUGHNESS IN COLD-STORED COD

OCCURRENCE OF SUGARS IN POST-MORTEM COD

4.11 FATTY ACIDS OF COHO SALMON FINGERLINGS

Ackman, R. G. (Halifax Laboratory, Fisheries Research Board of Canada, Halifax, Nova Scotia)
Journal of the American Oil Chemists' Society 44, No. 6, 372 (June 1967)

Analysis of a facsimile gas chromatogram is suggested by the author as alternative identifications for some of the C_{18} and longer-chain fatty acids of coho salmon fingerlings.* The fatty acid composition of the coho salmon shows the high proportion of total linoleic (ω6) type of fatty acids relative to the total linolenic (ω3) type of fatty acids. This feature had been proposed as characteristic of fats from fresh-water fish.

See table on the back of this card.

*Approximate percentages of total fatty acids are obtained by comparing peak sizes and tabulated percentages.

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 ABSTRACTER: M. F. Tripple

6.1 PIG STARTERS

Meade, R. J. (Department of Animal Science, University of Minnesota, St. Paul)
Feedstuffs 39, No. 39, 18-19, 22 (September 30, 1967)

Starter diets containing from 17 to 20 percent protein are adequate for pigs that have been weaned when they are about 3 weeks old. The nutritional success of the diets, however, is governed by the source of the protein. Using 2,059 pigs distributed among experiment stations in four different areas, the author obtained information about how the kind and form of starter affects the rate of gain and the feed-to-gain ratio in the pigs.

Of the five diets fed, three are of especial concern to the fisheries. They were constituted as shown in the table on the back of the card.

Results of the tests showed that gains made by pigs eating Diet 4 were no more rapid and no more efficient than were those made by pigs eating a corn meal-soybean meal diet. Pigs fed Diet 5 consumed more feed, gained more rapidly--from 10.1 to 7.9 percent--and were heavier at 9 weeks, regardless of the geographical area in which they were raised, than were those fed Diet 1 or Diet 4. Gain-to-feed ratio was about 10 percent better in pigs fed Diet 5.

Neither protein level sequence during the period when the pigs were from 3 to 9 weeks old nor the form of the starter (pellets or granules) significantly

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 ABSTRACTER: L. Baldwin

4.29 A NEW GROUP OF ESSENTIAL FATTY ACIDS AND THEIR COMPARISON WITH OTHER POLYENOIC FATTY ACIDS

Schlenk, H., and D. M. Sand (The Hormel Institute, University of Minnesota, Austin)
Biochimica et Biophysica Acta, Lipids and Lipid Metabolism 144, No. 2, 305-320 (October 2, 1967)

Previous work by the authors had shown that in fat-deficient rats the acids 9,12-17:2 and 6,9,12-17:3 are converted into 8,11,14-19:3, 5,8,11,14-19:4, 7,10,13,16-21:4, and 4,7,10,13,16-21:5. The metabolism of polyunsaturated 17ω5 acids was equivalent to that of polyunsaturated 18ω6 (linoleic type) acids and conversions occurred at about the same rate. The purpose of this study was to determine if these odd-numbered fatty acids had physiological effects similar to those of the even-numbered fatty acids.

Polyenoic C_{17} acids, mainly 9,12-heptadecadienoic and 6,9,12-heptadecatrienoic with some 6,9,12,15-heptadecatetraenoic; polyenoic C_{16} acids, mainly 9,12-hexadecadienoic and 6,9,12-hexadecatrienoic; and 10,13 nonadecadienoic acid were fed as methyl esters to fat-deficient rats for 50 days, during which time external symptoms of fat deficiency were observed. The fatty acids of the liver were then analyzed. The same experiment was conducted feeding polyenoic C_{16} acids and 10, 13-19:2 acid. Rats fed diets free of fat or supplemented with linoleic acid were used as controls. The effects of the acids on fat deficiency symptoms were compared with those of linoleic acid and the fat-free diet.

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 ABSTRACTER: M. F. Tripple

6.31 (*) PLANKTON IN THE SONIC SCATTERING LAYER IN THE OKHOTSK SEA, SUMMER 1963

Minoda, Takashi, and Keisuke Osawa
Bulletin of the Faculty of Fisheries Hokkaido University 18, No. 1, 9-19 (May 1967) (In Japanese, English summary)

From August 11-16, 1963, the vertical distribution of zooplankton in relation to the depth of the sonic scattering layer was examined along the shelf water of the Okhotsk Sea. During the day, the sonic scattering layer was usually positioned at the lowest part of the thermocline (that is, at a depth of from 20 to 60 meters); at night, it was near the surface. To ensure that samples came from above and below the sonic scattering layer as well as from within the layer, the collectors took their samples with horizontal tows consisting of three or four open nets 45 cm. in diameter, 180 cm. long, and having 0.33 mm. apertures in the mesh.

The largest biomass of mixed zooplankton was collected at the thermocline during the day and at the surface at night; in other words, three or four layers of plankton were nearly always grouped about the sonic scattering layer. Analysis of the catch revealed that such small copepods as Pseudocalanus minutus, Acartia longiremis, and Oithona similis, which were concentrated at the thermocline in the daytime, probably cause the sonic scattering. Downward migration of these copepods is possibly restricted by the thermocline; as a result, the sonic scattering

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 ABSTRACTER: L. Baldwin

FATTY ACIDS OF SALMON FINGERLINGS

ESSENTIALITY AND CONVERSION OF FATTY ACIDS

EFFECT OF FISHMEAL IN STARTER DIETS FOR PIGS

RELATION OF PLANKTON TO THE SONIC SCATTERING LAYER

4.29

Polyenoic C_{17} acids cure the external symptoms of fat deficiency nearly as well as linoleic acid does. The weight gains and food efficiencies are the same with both polyenoic C_{17} acids. Accordingly, fatty acids derived from 9,12-heptadecadienoic acid are essentially similar to the fatty acids derived from linoleic acid. The triene/tetraene ratio in liver lipids is applicable as an index of essential fatty acid nutrition when it is modified from 5,8,11-eicosatrienoic/arachidonic to 5,8,11-eicosatrienoic/5,8,11,14-nonadecatetraenoic acids. Deficiency symptoms increased with polyenoic C_{16} and 10,13-nonadecadienoic acids as they did with the fat-free diet.

Fatty acids of the liver were analyzed; 9,12-heptadecadienoic acid is converted to 4,7,10,13,16-heneicosapentaenoic acid and 5,8,11,14-nonadecatetraenoic acid is prominent. Similarly, 6,9,12,15-heptadecatetraenoic acid is converted to 4,7,10,13,16,19-heneicosahexaenoic acid. Conversion products from other unusual dietary acids were identified but were quite minor. Acids that converted readily were also essential, and acids that converted only to a minor extent were not essential. Conversion and essentiality may require the same double-bond structure, and these properties may be functionally correlated. Since the essentiality of isomers of arachidonic and similar acids is not yet known, such an hypothesis can still be disputed.

6.31

created by the small copepods is limited to the area above the thermocline, which the copepods do not penetrate during the day. In contrast, Metridia pacifica was collected from a layer deeper than the thermocline during the day; it was not found in large numbers at the sonic scattering layer. At night, however, it congregated at the surface with the species that caused sonic scattering.

Large plankton, such as euphausids, were not found in quantity in the shallow shelf water, so they cannot be held responsible for the sonic scattering.

6.31 THE ASSESSMENT OF THE PRINCIPAL PUBLIC RADIATION EXPOSURE FROM, AND THE RESULTING CONTROL OF DISCHARGES OF AQUEOUS RADIOACTIVE WASTE FROM THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY FACTORY AT WINDSCALE, CUMBERLAND

Preston, A., and D. F. Jefferies (Min. Agr., Fisheries Food, Lowestoft, England) Chemical Abstracts 67, No. 4, 14710b (July 24, 1967)

4.11

Suggested Alternative Identifications for C_{18} to C_{22} Fatty Acids in Coho Salmon Fingerlings

Suggested fatty acid identifications	Approximate percentages of total fatty acids	Original peak designation
18:0	6.1	18:0
18:1	19.3	18:1
18:2ω6	11.7	18:2
18:3ω6	0.8	18:3
18:3ω3	4.3	18:4
18:4ω3	3.0	20:1
20:1	2.0	20:1
20:2ω6	2.4	20:2
20:3ω6	1.2	20:3
20:4ω6	3.8	20:4
20:4ω3	0.6	22:1
20:5ω3	3.5	20:5
21:4ω2	0.8	22:2
21:5ω2	0.3	....
22:1	0.6	22:1
22:2ω6	0.5	....
22:4ω6	1.2	22:3
22:5ω6	0.4	22:4
22:5ω3	1.8	22:5
22:6ω3	7.4	22:6

6.1

affected the pigs' carcass characteristics or the rate and efficiency of gain after they were over 9 weeks old. Only in the northcentral area did the kind of starter appreciably influence the final weight of the pigs, Diet 5 causing them to be 10.6 percent heavier than those fed Diet 1. When pigs at all stations are considered, those fed Diet 5 averaged about 7 percent more gain per unit of feed than did those fed the other diets.

Ingredient	Percent of diet		
	1	4	5
finely ground yellow corn	74.0	66.4	59.5
soybean meal (50 percent)	23.0	18.5	15.5
sugar (sucrose)			10.0
dried skim-milk			10.0
dried whey		10.0	
fishmeal		3.0	3.0
dicalcium phosphate	1.3	0.7	0.7
ground limestone	1.2	0.9	0.8
trace mineralized salt	0.5	0.5	0.5
vitamin-antibiotic premix	+	+	+

The 5.4 percent improvement in feed conversion efficiency (equivalent to 56 lb. of liveweight per ton of feed eaten) resulting from Diet 5 was considered in terms of its added cost. The average cost of Diets 1, 4, and 5, all bought from a commercial source, was $90.80, $98.50, and $131.10, respectively. Thus the cost per hundredweight of liveweight was $8.67, $9.35, and $11.66, respectively. The author concludes that adding fishmeal and dried whey or sucrose and skim-milk does not produce enough improvement in gain-to-feed ratio to justify the added cost.

[15 references]

EFFECT OF RADIOACTIVE EFFLUENT ON SEAWEED

7.45 (*) MICRO METHODS FOR THE QUANTITATIVE DETERMINATION OF IRON AND COPPER IN BIOLOGICAL MATERIAL

Bogart, Mildred Van De, and Helmut Beinert (Institute for Enzyme Research, University of Wisconsin, Madison)
Analytical Biochemistry 20, No. 2, 325-334 (August 1967)

Many procedures for the quantitative determination of iron and copper have been described; however, a need still exists for relatively simple methods that consume little material and involve a minimum of contamination risks. The procedures described in detail in this article were adapted from methods published by other scientists. Since the authors have used these methods for over 10 years, they have had the opportunity to recognize and eliminate most of the difficulties inherent in the methods and to develop a procedure suited for routine use.

The following features appeared to be desirable and were incorporated into the procedures:

1. Less than 1 µg. of element is required for optimal readout, which in the case of proteins is about 1 mg. of total sample.
2. The sample is ashed so that all the metal is liberated, and any complexing agent is destroyed because such compounds are routinely added to or carried along in preparations containing proteins.
3. Wet ashing is preferable, and the total volume of liquid should not exceed ~1 ml.

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 ABSTRACTER: M. F. Tripple

7.51 (*) STRUCTURE AND ORGANIZATION OF ACTIN IN A MOLLUSCAN SMOOTH MUSCLE

Lowy, J., and P. J. Vibert (MRC Biophysics Research Unit, 26-29 Drury Lane, London, W.C.2, England)
Nature 215, No. 5107, 1254-1255 (September 16, 1967)

Electron microscopy has shown that the actin filaments from muscles are double helical structures composed of globular units spaced about 55 Å apart. This structural picture is in agreement with X-ray diffraction studies on certain dried molluscan muscles. Analysis of the moderate-angle patterns suggested two alternative helical actin models. One structure has 13 units in each turn of the helix, giving a helical repeat of 350 Å; the other structure has 15 units, giving a helical repeat of 410 Å. For an understanding of the contractile mechanism it is important to determine the helical repeat and to establish whether any changes occur in the actin structure during normal contraction.

The authors studied actin structure in several molluscan smooth muscles, particularly in the anterior byssus retractor muscle of Mytilus edulis by X-ray diffraction. The diffraction patterns from the muscle in the living relaxed state showed certain features that had not been seen before and which procided new information about the organization of actin filaments in this particular muscle.

It was considered likely that the actin helix does not contain an integral number of units, and that the structure repeats at intervals of about 360 Å. A

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 ABSTRACTER: M. F. Tripple

7.523 COMPARISON OF METHODS FOR THE DETERMINATION OF AVAILABLE LYSINE VALUE IN ANIMAL AND VEGETABLE PROTEIN SOURCES

Roach, A. G. (John Tyzack and Partners, Ltd., 10 Hallam Street, London, W.1, England), and P. Sanderson and D. R. Williams (R. Silcock and Sons, Ltd., 55 Derby Road, Liverpool 20, England)
Journal of the Science of Food and Agriculture 18, No. 7, 274-278 (July 1967)

Heat applied during the manufacture of vegetable and animal meals and during the extraction of oil can cause a loss of amino acids, particularly lysine. Severe heating, however, is usually harmful, since, by damaging or modifying the amino acids in the meal, it impairs the protein quality of the meal and results in a loss of nutritionally available amino acids.

Many attempts have been made to establish a reliable chemical method for measuring available lysine. The methods are based on the reaction of the amino group with 1-fluoro-2,4-dinitrobenzene to form mono ε 2,4-dinitrophenyl (DNP) lysine. Using chicks as test animals, Carpenter et al. (1955, 1957, 1958, and 1960) showed that free ε amino groups associated with lysine are highly correlated with the nutritional availability of the lysine. They found no such correlation between chick growth and total lysine. Since the lysine that had its ε amino groups bound could not be freed by enzymatic hydrolysis, they concluded that such lysine has no nutritional value.

(over)

 ABSTRACTER: L. Baldwin

7.53 A METHOD FOR CALCULATING THE RATIO OF EACH POSSIBLE TYPE OF TRIGLYCERIDE IN NATURAL FAT

Hayakawa, Kan-Ichi (Food Science Department, Rutgers, The State University, New Brunswick, New Jersey)
Journal of the American Oil Chemists' Society 44, No. 6, 354-356 (June 1967)

A generalized method for calculating the weight ratios or mole fractions of each type of triglyceride in a natural fat was developed by applying Vander Wal's method for calculating mole fractions. In the proposed method for calculating the ratio of each triglyceride, a generating function was introduced to permit a more generalized approach to the problem and to calculate the mole fractions of triglycerides.

The mole fractions of component fatty acids in corn oil were calculated from the weight ratios of the fatty acids by using the equations

$ABC_v = WABC_v / \left\{ W_v \cdot \sum_{i=1}^{n} WABC_i/W_i \right\}$ and $AC_v = WAC_v / \left\{ W_v \cdot \sum_{i=1}^{n} WAC_i/W_i \right\}$. (See definition of terms on back of card.) The value for ABC_1 was calculated as follows:

$$ABC_1 = \frac{\frac{0.118}{256.4}}{\frac{0.118}{256.4} + \frac{0.019}{284.5} + \frac{0.291}{282.5} + \frac{0.564}{280.4} + \frac{0.008}{278.4}} = 0.128$$

(over)

 ABSTRACTER: M. F. Tripple

DETERMINATION OF IRON AND COPPER IN BIOLOGICAL MATERIAL

STUDY OF ACTIN IN MOLLUSCAN SMOOTH MUSCLE

MEASURING AVAILABLE LYSINE IN ANIMAL AND VEGETABLE MEALS

CALCULATING RATIOS OF TRIGLYCERIDES

7.51

new feature seen in diffraction patterns from the living relaxed muscle is an intensity maximum on both the 59 Å and 51 Å layer lines. These maxima are interpreted to indicate the presence of an interference function resulting from an ordered arrangement of actin filaments. The authors concluded from their observations that in the anterior byssuss retractor muscle of the mussel regions exist where actin filaments are organized in a partial three-dimensional order, that this organization degenerates about 2 days after isolation, and that a two-dimensional order can be maintained for up to three times as long. Additional results indicate that the equatorial reflexion is caused by the organization of actin filaments and that the equatorial reflexion degenerates along with the actin pattern. So far this muscle is the only one in which some degree of three dimensional organization of actin filaments has been found.

The authors searched for the helical repeat of the actin structure in other muscles and determined that when the same method is used and the muscles are examined in the same state, the value obtained is the same. The value of about 360 Å was found for muscles as different in structure and function as the sartorius muscle of the toad and the anterior byssuss muscle retractor of the mussel. This indicated that the actin structure might be similar in all muscles; however, many more types of muscles will have to be examined before a definite conclusion can be reached. [16 references]

7.51 IMPROVED CHROMATOGRAPHIC SEPARATION OF GLIADIN PROTEINS ON SULFOETHYL CELLULOSE

Huebner, F. R., and J. S. Wall (Northern Regional Res. Lab., Peoria, Illinois) Chemical Abstracts 65, 2603e (July 18, 1966)

7.53

Negative values for B_1 and B_2 are probably due to analytical error and were replaced by zeros in the calculation. To achieve unity for the sum of B_i, the values for B_3 and B_4 are modified to 0.297 and 0.703, respectively. By modifying these numerical values, units for the sum of mole fractions of all possible triglycerides is assured. The modifications provide a means for checking the numerical calculations of the mole fractions.

If the 1,3-random-2-random distribution of acyl groups is applicable, and if α terms of AC_i and β terms of B_i are nil, the number of possible triglycerides (N_v) in corn oil is determined by the equation $N_v = (n - \alpha)\cdot(n - \beta)\cdot(n - \alpha + 1)\ /2$ with $n = 5$, $\alpha = 0$, and $\beta = 3$. The equation then reads

$$N_v = (5 - 0) \cdot (5 - 3) \cdot (5 - 0 + 1)\ /2 = 30.$$

Definition of Terms.--A, B, C are positives 1, 2, and 3, respectively, of (triglyceride) fatty acids. i, l, n, and v; 1, 2, 3, and 4 are integers representing fatty acids or acyl groups. (For example, ABC_i is the mole fraction of fatty acid i located at positions 1, 2, and 3 related to the total number of moles of all fatty acids located at positions 1, 2, 3.)

W is the molecular weight of the fatty acid represented by the integer, such as W_i.

W followed by positions and integers (for example, WABCi) is the weight ratio of the fatty acid located at the indicated positions to the total weight of fatty acids at the same positions.

N is the number of all possible triglycerides and N_v is the number of all possible triglycerides when the 1,3-random-2-random distribution is applicable.

α is the number of AC_i terms with a negligible numerical value.

β is the number of B_i terms with a negligible numerical value.

7.45

4. Neutralization of the acid digest does not require pH measurement with the danger of contamination.
5. No transfer or volumetric measurement is necessary.
6. Spectrophotometry of the colored complex is not carried out in the original aqueous phase to avoid interference from other solutes.

The essential features of the methods for determining iron and copper are wet washing, evaporation of excess acid, reduction, neutralization with excess sodium acetate, development of color with a suitable bathophenanthroline, and extraction with a small quantity of organic solvent, followed by spectrophotometric determination.

The article discusses in detail the reagents, glassware, and apparatus to be used and the procedures to be followed in the determination of iron and copper.

7.42 MICROVOLUMETRIC TRILON DETERMINATION OF IRON IN FISH PRODUCTS

Aleksandrovich-Mel'nikova, A. S., and E. N. Baranovich (Tech. Inst. Fish Ind. and Econo., Astrakhan, U.S.S.R.)
Chemical Abstracts 64, 4167g (January 31, 1966)

7.523

The Carpenter method, though well established for measuring available lysine in animal protein products, has a number of disadvantages when used on cereals and oilseed meals: recovery of ϵ DNP lysine is poor and results are variable. The reasons given for the poor results are said to be associated with the destruction of ϵ DNP lysine by carbohydrates during hydrolysis and the formation of colored byproducts that are not easily separated from the DNP lysine.

A method propounded by Rao et al. in 1963 theoretically has the same disadvantages--it uses the Carpenter hydrolysis technique followed by ion-exchange chromatography to isolate the ϵ DNP lysine formed. A direct measure of available lysine, it is acceptably reproducible, and its recovery of ϵ DNP lysine that has been added to cottonseed meals is high. However, Rao did not compare his data with Carpenter's.

The authors of the present report used a method whereby they could calculate available lysine by measuring (1) the total lysine in an acid hydrolysate, (2) the lysine remaining in solution after the protein treated with 1-fluoro-2,4-dinitrobenzene had been separately hydrolyzed, and (3) the difference between the two values. This difference represents the lysine that has free ϵ amino groups and is, by Carpenter's theory, therefore available lysine.

The experiment reported was designed to compare the performance of the three methods when used on fishmeal and groundnut meal. The results, illustrated in a table and graphs, give information about mean values and standard deviations for lysine and available lysine, recoveries of ϵ DNP lysine, effects of heat damage, and statistical significance. When correction factors were applied to the Carpenter and the Rao data, agreement of the three methods was good. Since the authors' method requires no such correction, it is advanced as an attractive means of assessing protein value where automatic amino-acid analysis is routine.

CHROMATOGRAPHIC SEPARATION OF GLIADIN PROTEINS

DETERMINATION OF IRON IN FISH PRODUCTS

7.80 (*) SEQUENTIAL PROCEDURES FOR TRIANGULAR AND PAIRED COMPARISON TASTING TESTS

Steiner, E. H. (British Food Manufacturing Industries' Research Association, Leatherhead, Surrey, England)
Journal of Food Technology 1, No. 1, 40-53 (March 1966)

Both triangular tests and paired comparisons are used for the organoleptic comparison of two different products. When a result has been obtained from a taste panel, it is common practice to assess the significance of the result by reference to statistical tables based on the binomial distribution. A result is normally considered to be significant if the probability of obtaining it by chance when the samples are identical is less than 1 in 20 or 1 in 100. However, it is not common practice to set up any criterion for the amount of tasting to be done before arriving at a decision. This is important when a nonsignificant result is reached because it affects the chance of this happening when the samples are in fact different.

The necessary number of taste tests that must be carried out when two samples are compared by triangular tests or paired comparisons are considered in relation to the following: (1) the risk of stating that the samples are different when in reality they are not distinguishable, (2) the risk of stating the samples are identical when a distinguishable difference does exist, and (3) the degree of difference the tests are designed to distinguish. Sequential procedures are
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 ABSTRACTER: M. F. Tripple

7.879 NUCLEOTIDE DEGRADATION, MONITORED BY THIN-LAYER CHROMATOGRAPHY, AND ASSOCIATED POSTMORTEM CHANGES IN RELAXED COD MUSCLE

Fraser, Doris I., J. R. Dingle, J. A. Hines, Sandra C. Nowlan, and W. J. Dyer (Fisheries Research Board of Canada, Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 8, 1837-1841 (August 1967)

Although the rate and extent of postmortem nucleotide degradation that leads to accumulation of hypoxanthine has been established for several species of trawled or exhausted fish during iced storage, no comparable studies have been made of fish muscle that is completely relaxed at death. For such an investigation, the authors sought a rapid procedure for following nucleotide breakdown in greater detail than that afforded by nonspecific ultraviolet absorption examination of neutralized perchloric acid extracts or measurement of acid-labile phosphorus. Thin-layer chromatography appeared to offer the rapid resolution required and had been used successfully to separate mixtures of nucleotides, nucleosides, and bases.

Anion-exchange chromatography on 0.5-mm. layers of polyethyleneimine-cellulose applied to plastic sheet was used to achieve rapid and complete separation of the major nucleotides, nucleosides, and bases in neutralized perchloric acid extract of muscles. The chromatograms were first developed in distilled water to effect resolution of inosine and hypoxanthine, followed after intermediate drying
(over)

 ABSTRACTER: M. F. Tripple

7.80 (*) TEXTURE AND pH IN FISH MUSCLE RELATED TO 'CELL FRAGILITY' MEASUREMENTS

Kelly, K. (Unilever Research Laboratory, Aberdeen, Scotland), N. R. Jones, R. M. Love, and J. Olley (Torry Research Station, Aberdeen, Scotland)
Journal of Food Technology 1, No. 1, 9-15 (March 1966)

Three groups of workers have independently been studying the texture of cod muscle. K. Kelly was interested in the cold-storage behavior of commercially caught cod, N. R. Jones was studying practical methods of fillet freezing on fish of varying physiological conditions, and R. M. Love and J. Olley were basically concerned with the problem of deciding whether the cell fragility method or the soluble protein method of determining protein denaturation was most closely related to textural changes and free fatty acid production. The initial experiments of these three groups led them to the same conclusions, and the results have been summarized in this paper.

The cell fragility method relates the protein denaturation of cold-stored fish to the optical density of muscle homogenate. A high cell fragility value has been claimed to indicate frozen fish of good quality while a low cell fragility value would indicate considerable cold-storage deterioration. The three independent groups of researchers have shown that the initial optical density of a muscle homogenate may vary considerably. The optical density would appear to be correlated with the pH of the muscle, which in turn is related to the texture. It has been
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 ABSTRACTER: M. F. Tripple

7.89 DETERMINATION OF ISOPROPYL ALCOHOL IN FISH PROTEIN CONCENTRATE BY SOLVENT EXTRACTION AND GAS-LIQUID CHROMATOGRAPHY

Ackman, R. G., H. J. Hingley, and H. E. Power (Fisheries Research Board of Canada Halifax Laboratory, Halifax, Nova Scotia)
Journal of the Fisheries Research Board of Canada 24, No. 7, 1521-1529 (July 1967)

Isopropyl alcohol is the basic solvent used to remove water, associated solubles, and lipids during some methods of producing fish protein concentrate (FPC). Determination of the amount of residual isopropyl alcohol in FPC is necessary, since large amounts of the ingested substance can have harmful physiological effects on the consumer. Determination by weighing to constant dry weight or by analysis of head-space volatiles is impractical. Moreover, if the final step in production, a heating process, failed to remove the isopropyl alcohol, it would be logical to assume that the alcohol was bound in some fashion that would prevent the necessary equilibrium's being attained.

The authors, therefore, decided to use a method whereby the isopropyl alcohol would be dissolved in methyl acetate, a solvent that is suitable for direct determination, without concentration steps, of the alcohol residues by means of a sensitive flame ionization, gas-liquid chromatographic detector. Four samples of FPC prepared from cod fillets and cod trimmings and a standard commercial fishmeal made from herring were used in the analysis.
(over)

 ABSTRACTER: L. Baldwin

SEQUENTIAL PROCEDURES FOR TASTE TESTS

CELL FRAGILITY MEASUREMENTS OF COD MUSCLE

CHROMATOGRAPHIC ANALYSIS OF NUCLEOTIDE DEGRADATION

DETERMINING ISOPROPYL ALCOHOL IN FISH PROTEIN CONCENTRATE

7.80

found that a fish with a high pH has a soft texture and gives a low cell fragility reading, while a fish with low pH has a firmer texture and gives a high cell fragility reading.

The denaturation of muscle at low temperatures is slight during cold storage, so the pH effect may well predominate in determining the optical density of the homogenate. Therefore, while the cell fragility technique is not invalidated as a research tool, it is concluded that it can give misleading information when used on commercial samples of unknown pH.

7.80 A CLASSIFICATION OF OBJECTIVE METHODS FOR MEASURING TEXTURE AND CONSISTENCY OF FOODS

Bourne, M. C. (New York State Agricultural Experiment Station, Cornell University, Geneva 14456)
Journal of Food Science 31, No. 6, 1011-1015 (November-December 1966)

Numerous methods for objectively measuring the texture of foods are classified on the basis of the variable or variables that are the basis of measurement. Methods of physical measurement are classified as to force-, distance-, time-, energy-, ratio-, and multiple-measuring, and multiple-variable instruments. Some chemical methods for objectively measuring texture also exist. Methods of measurement that are neither physical nor chemical are placed in a special, miscellaneous group. Examples are given of the types of instruments found in each of the three categories. [33 references] [Abstracter: M. M. Gwin]

7.80

proposed that enable a decision to be reached relatively rapidly, with 1 in 20 risks of error, when the two samples are identical or differ in a defined amount. Tables are given for difference testing and quality testing. The author suggests that in cases where the sequential test would be lengthy, the procedure may be arbitrarily terminated, which only slightly increases the risk of error. [9 references]

7.80 QUALITY JUDGEMENT OF FISH AND SHRIMPS

Ruiter, A.
Visserij-Nieuws 18, No. 5, 155-162 (1965) (In Dutch)
World Fisheries Abstracts 16, No. 3, 45-46 (July-September 1965)

The organoleptic changes in fresh fish are enumerated and the following methods for estimating quality are discussed: the germ-count method, the TVB and the TMA test, the VRS method, the hypoxanthine test, pH measurements, estimation of the refractive index of the eye fluid, reduction of triphenyl tetrazoliumchloride, and measurements with a fish tester.

The author points out that objective quality assessments must be limited to laboratory experiments; to the inspection of well-defined, uncomplicated products, such as deep-frozen fillets; or to organoleptic assessment. Therefore, objective quality measurements probably will never play an important part in the fish trade, considering: (a) the complexity and variability of the process of spoilage, and (b) the fact that quality is not dependent on freshness alone.
[Extractor: L. Baldwin]

7.89

When the fishmeal was extracted with methyl acetate, no isopropyl alcohol or other material of the same gas-liquid chromatography retention time appeared. When 1, 5, and 10 µl. of isopropyl alcohol was added to 2 g. of the meal, recovery by means of the hot-extraction, methyl-acetate procedure was in the range of 95-106 percent. The amount of isopropyl alcohol added created no bias in the recovery results, although 1 µl. additions gave fairly erratic recoveries.

When FPC was vacuum stripped, from 30 to 40 percent of the original isopropyl alcohol remained, even after an appreciable weight loss. Recoveries from samples vacuum stripped without heat, with and without added isopropyl alcohol, were 96 and 100 percent, respectively. Two separate analyses of one of the samples vacuum stripped for 4.5 hr. without heat revealed a weight loss of 4.1 percent and an isopropyl alcohol content of 0.46 and 0.48 percent.

The vacuum stripping experiments and the high level of residual isopropyl alcohol in the sample of FPC that had been exposed to the atmosphere for over a year revealed shrinkage of the outer layers of protein, an encapsulation of water and solvent within the particles, and a hardening of the surface shell of the particle. The result is an almost complete sealing of the isopropyl alcohol within the particle. The difference in drying conditions; the structural weakness of the particles; and the nature of the processing before final drying, by altering the porosity of the particles, could all affect the amount of isopropyl alcohol retained in FPC.

The three brief extractions with methyl acetate under reflux conditions reduced isopropyl alcohol from 2.6 percent to 0.06 percent. Therefore the authors conclude that isopropyl alcohol can be successfully removed from laboratory samples or from commercial products by the technique they have developed.
[11 references]

7.879

by a second development with increasing concentrations of LiCl to resolve nucleotides. Concentrations of adenosine triphosphate (ATP), adenosine diphosphate (ADP) and inosine monophosphate (IMP) were determined by cutting out the spots, eluting them, and measuring the absorbance.

This thin-layer chromatographic technique proved successful in monitoring the sequence of postmortem nucleotide degradation at 0° C. in cod fillets (Gadus morhua) with muscle relaxed at death by anesthesia. Relaxed cod muscle stored in ice had a high initial level of ATP of about 5 µmole per g., which was maintained to 24 hr. post mortem. Maintenance of ATP for 24 hr. was in contrast to the rapid disappearance of the nucleotide with 12 hr. in rested cod muscle. Initial IMP levels of 1 µmole per g., however, suggested that rested fish might not have been in a truly rested condition. In the relaxed cod the high and constant level of ATP was undoubtedly maintained, through resynthesis, by the appreciable amounts of creatine phosphate (CP) initially present in the muscle. These initial conditions of high CP and ATP levels delayed the onset of rigor in relaxed cod to 48 hr. post mortem, compared with 12 hr. and 6-7 hr. for cod in which ATP fell from time of death.

Concomitantly with the rapid dephosphorylation of ATP after 24 hr., levels of IMP rose rapidly to about 5 µmole per g. at 3 days. Amounts of nucleotides determined in the chromatographic eluates were consistent with apparent dephosphorylation and deamination indicated by ultraviolet absorption data. IMP was subsequently dephosphorylated rapidly, with peak levels of inosine attained at 4 days and maintained to 9 days. Degradation of inosine to hypoxanthine followed, with rapid accumulation of hypoxanthine between 7 and 11 days, which was coincident with the onset of bacterial spoilage. [15 references]

CLASSIFICATION OF METHODS FOR MEASURING FOODS

JUDGMENT OF QUALITY IN FISH AND SHRIMP

7.89 USE OF STANDARDIZED COLOUR SURFACES IN THE GRADING OF CANNED SALMON FOR COLOUR

Bolton, R. S., J. H. Mann, and W. Gushue (Department of Fisheries, Vancouver, British Columbia)
Journal of the Fisheries Research Board of Canada 24, No. 7, 1613-1622 (July 1967)

In the United States, Canada, Russia, and Japan, five species of the genus Oncorhynchus are canned under the name Pacific salmon. They are sockeye or red salmon (O. nerka), chum salmon (O. keta), silver or coho salmon (O. kisutch), pink salmon (O. gorbuscha), and chinook or tyee salmon (O. tshawytscha). The flesh of canned sockeye is a bright orange-red; that of chum is pale buff, or even gray; that of coho is almost as red as sockeye; that of pink varies from delicate peach to light buff; and that of chinook varies from bright red to almost pure white. Since color is an important criterion of quality in salmon, some method of measuring color characteristics accurately is a requisite of grading. This article describes the development of such a method.

The first instrument used by the Fish Inspection Laboratory at Vancouver (British Columbia) was a colorimeter specifically developed for assessing the color of canned salmon. It incorporated a prismatic device that permitted crumbled salmon tissue under standard illumination to be visually compared with light reflected off a white surface through a combination of red and yellow Lovibond glasses. The color was determined in terms of so many red or yellow Lovibond units. Although the readings in red units corresponded well with subjective color ratings, the instrument was never quite satisfactory--measurements were

 ABSTRACTER: L. Baldwin

9.12 (*) CYTOCHROME C AND EVOLUTION

Yamanaka, T. (Department of Chemistry, Revelle College, University of California, San Diego, and Department of Biology, Faculty of Science, Osaka University, Toyonaka, Osaka, Japan)
Nature 213, No. 5082, 1183-1186 (March 25, 1967)

A scheme is proposed for the evolutionary relations of living organisms that is based (1) on data concerning the reactivities of cytochromes c of various organisms with cytochrome oxidase from Pseudomonas and from a bovine; (2) on the assumption that denitrifying organisms are the most primitive organisms; and (3) on the similarity of heme d to chlorophyll. The cytochromes c that react quickly with the bovine cytochrome oxidase are found in living organisms that evolved after algal photosynthesis began and thus utilize molecular oxygen. Species of fish (tuna, salmon, mackerel, bonito, and shark), species of mollusk (oyster and squid), and species of arthropod (prawns) were among the organisms studied. All of these species were found to have evolved after algal photosynthesis began, because their percent reaction with the cytochrome oxidase of the bovine was fairly high. Tuna was the only species showing a relative reactivity with the cytochrome oxidase of the bovine of under 50 percent. It was concluded that tuna evolved earlier after algal photosynthesis began than the other species evolved.

The author presents a graph of the evolutionary relations of organisms based on the reactivities of the cytochromes c of these organisms with Pseudomonas and

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 ABSTRACTER: M. M. Gwin

9.11 (*) ON THE DSL [DEEP SCATTERING LAYER] IN THE NORTHWESTERN AREA OF THE NORTH PACIFIC OCEAN. I - RELATIONSHIP BETWEEN VERTICAL MIGRATION OF DSL, SUBMARINE ILLUMINATION, AND PLANKTON BIOMASS

Suzuki, Tsuneyoshi (Fac. of Fish. Hokkaido Univ., Hakodate, Japan), and Jun Ito (Hokkaido Reg. Fish. Res. Lab., Hakodate, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 4, 325-337 (April 1967)

The deep scattering layer in the sea may be caused by the reflection of sonic waves from pycnocline or layers of small organisms. The purpose of this study was to determine the relation between vertical migration of the deep scattering layer, submarine illumination, and plankton biomass, and the ecology of salmon in the northwest area of the North Pacific Ocean. Two ultrasonic finders of 200 KC and 28 KC were attached to the hull of the ship.

The surface of the sea averaged a daylight intensity of $(4\text{–}6) \times 10^2$ light at sunrise and sunset, and an intensity of $(8\text{–}10) \times 10^4$ lux at noon. During the period of observations, the sky was overcast. Transparency of the water was 15 meters. Submarine illumination was as high as one light at 62–64 m. depth at sunrise and sunset, and at 123–125 m. depth at noon. One or two layers of deep scattering layer were usually observed and these two layers changed their depth diurnally. A third layer was sometimes seen, but it did not shift vertically. The vertical movement of the first and second layers of deep scattering layer varied in response

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 ABSTRACTER: M. M. Gwin

9.125 ROLE OF RED AND WHITE MUSCLES IN THE SWIMMING OF THE SKIPJACK TUNA

Rayner, M. D., and M. J. Keenan (Pacific Biomedical Research Center, University of Hawaii, Honolulu)
Nature 214, No. 5086, 392-393 (April 22, 1967)

In several respects, the skipjack tuna (Katsuwonus pelamis) may be considered the most highly specialized of the scombroid fishes because the swim bladder has been lost, the branchial musculature is reduced, and the deep red muscle, found only in tunas, assumes the largest proportion of the trunk musculature of any of the tuna species. Constant forward motion is required by the tuna to give hydrodynamic lift and to provide a flow of water over the gill surfaces; it is reasonable to assume that the large amount of deep red muscle is associated with these requirements. Braekkan (1956) concluded that this deep red muscle functions as a store of energy for the adjacent region of white muscle, rather than acting as a contractile tissue in its own right. However, the constant basal swimming of scombroids might be the result of red muscle contraction. The question was raised of whether or not the deep red muscle in scombroids performs a maintenance function or a contractile function.

Preliminary results of recordings from some 40 tuna indicated electrical activity in the deep red muscle in almost all cases in which any swimming movements could be seen. During low-frequency swimming movements, some electrical activity

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 ABSTRACTER: M. F. Tripple

COLOR GRADING OF CANNED SALMON

OCEANIC DEEP SCATTERING LAYER

EVOLUTION OF FISHES

ROLE OF MUSCLES IN SWIMMING SKIPJACK TUNA

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to the submarine illumination. A velocity as fast as 3.4 m./min. was recorded for the ascending and descending movement of the deep scattering layer at sunrise and sunset. When the two ultrasonic finders were operated simultaneously, both layers of deep scattering layer were recorded by the 28 KC finder.

In determining the difference in reflection loss of sonic waves of 200 KC and 28 KC with plankton, a test was made in a water tank. The researchers found that the difference in reflection loss of Euphausia pacifica between 200 KC and 28 KC was about 5 db, and with copepods such as Calanus plumchrus and Calanus cristatus the loss was about 10 db. The difference may have been caused by the size of the organisms. Organisms collected from the first to third layers of deep scattering layer were mainly euphausids, copepods, and amphipods, Euphausids and copepods were abundant in the first layer, whereas only copepods occurred abundantly in the second layer. [18 references]

9.11 SONIC DETECTION OF A FRESH WATER-SALT WATER INTERFACE

Edgerton, Harold E. (Department of Electrical Engineering, Massachusetts Institute of Technology, Cambridge)
Science 154, No. 3756, 1555 (December 23, 1966)

The short-pulse sonar system would appear to be a useful method of finding fresh water-salt water interfaces in rivers and in offshore aquifers.

[Abstracter: M. F. Tripple]

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so time consuming that samplings were not adequate to reflect the variations within a given lot; so few of the instruments were available that the ratings were without meaning to many buyers; and, most important, the variation in sensitivity between people led to marked variations in ratings.

Efforts to modify the instrument solved the problem of matching colors but never that of significantly different readings by different operators. Even a multifilter electronic instrument that would be entirely independent of the human eye was not developed owing to its cost and lack of appeal to research institutions. Moreover, since canned salmon consists of sections of fish cut transversely from the whole eviscerated carcass, an operator's judgment is required to assess the color of muscle tissue as distinguished from skin, bone, vascular tissue, and light-colored belly flesh.

The most practical approach, then, seemed to be to use standard color surfaces that could be visually compared with the samples being inspected. Accordingly, the reflectance spectograms of salmon tissue were determined from existing data, and the characteristic profiles for canned salmon flesh at each of the color levels required were matched as closely as possible with pigmented enamels. The enamels were then sprayed and baked on porcelain tiles.

In operation, the tile color standards are arranged on a rack over the inspection table. Samples of fish are removed from the can, broken in the operator's hands, and held close to the standard. Colors can be assessed so rapidly that often a second operator is needed to record the data being read by the rating operator. Variations in readings between operators are said to be extremely rare.

DETECTION OF WATER INTERFACES

9.125

was also seen in the lateral superficial muscle. The deep red muscles did not show electrical activity in three fish during low-frequency swimming; however, activity was recorded in the lateral superficial muscle. No electrical activity was demonstrated in white muscle regions during the low-frequency swimming movements. On the contrary, the white muscle regions showed increasing activity at the higher tail-beat frequencies in the fish, and they also showed activity after tactile stimulation of the head and operculum. During this situation, white muscle activity sometimes occurred with tail beats of low-frequency and large amplitude. White muscle activity was not normally found in fish treated with pentobarbital, even after tactile stimulation. When spontaneous high-frequency swimming did occur, it was mediated entirely by increased red muscle activity.

A detailed anatomical study of the skipjack tuna showed that the deep red muscle is ideally placed to function, either independentaly or in conjunction with the white muscle, in the production of swimming movements. There would appear to be no basis for the statement that the red muscle functions only as a store of energy.

If the maintained low-frequency swimming movements in an experimental tank can be assumed to correspond to the basal swimming of a free fish, it would be reasonable to conclude that this basal swimming is caused entirely by the red muscle system. Thus, the white muscle appears to represent a reserve of power for short bursts of high activity. The activation of the white muscle system is voluntary in the sense that it only occurs after arousal.

9.12

bovine cytochrome oxidases. He also presents a diagrammatic representation of the evolutionary pattern from anaerobic to aerobic organisms. The author concludes that the reactivities of cytochromes c with cytochrome oxidases may provide a means to elucidate events that occurred during evolution. [53 references]

9.12 INVESTIGATION OF MECHANISMS RESPONSIBLE FOR THE RISE IN RESPIRATION WITH EMBRYONIC DEVELOPMENT IN FISH

Abramova, N. B., T. V. Likhtman, and A. A. Neifakh (A. N. Severtsov Inst. Animal Morphol., Moscow, U.S.S.R.)
Chemical Abstracts 63, 12045d (October 25, 1965)

9.12 SEASONAL VARIATIONS IN THE HORMONE CONTENT OF THE PITUITARY GLAND OF THE PERCH, PERCA FLUVIATILIS

Swift, Donald R., and Grace E. Pickford (Yale Univ., New Haven, Connecticut)
Chemical Abstracts 63, 7392e (September 13, 1965)

VARIATIONS IN PITUITARY GLAND OF PERCH
EFFECT OF EMBRYONIC DEVELOPMENT ON FISH RESPIRATION

9.15 (*) DIETARY INTAKE OF PESTICIDE CHEMICALS

Duggan, R. E. (Compliance, Food and Drug Administration), and J. R. Weatherwax (Bureau of Science, Food and Drug Administration, Washington, D.C.)
Science 157, No. 3792, 1006-1010 (September 1, 1967)

The average daily intake of pesticides was calculated from the findings of all pesticide chemical residues in or on samples collected on 46 days in 25 different cities. Residues of chlorinated organic pesticide chemicals were found in all diet samples and in all food classes at a daily intake of 0.0014 mg. per kilogram of body weight. Meat, fish, and poultry were the major sources of pesticide residues and in combination with poultry products accounted for more than half of the intake of chlorinated organic pesticide chemicals. DDT (dichloro-diphenyl-trichloroethane); its two analogs, dieldrin and lindane; and heptachlor epoxide accounted for 85 percent of the total intake of chlorinated pesticides; DDT alone accounted for 33 percent of the total.

The study was based on an amount of food consumption almost double that of the average individual's. The findings on these samples were lower than the acceptable daily intake or potential consumption at the tolerance level for DDT, lindane, malathion, carbaryl, dieldrin, heptachlor epoxide, 2,4-D,bromides, and arsenic. Although the residues of pesticide chemicals consumed in a normal well-balanced diet are below the limits of acceptable daily intakes, pesticide residues in foods are still a matter for continued concern. Samples of raw food were examined to

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ABSTRACTER: L. Baldwin

9.16 FISH FARMING PROFIT PROSPECT SAID TO BE EXTREMELY VARIABLE

Anonymous
Feedstuffs 39, No. 26, 32A, 32D (July 1, 1967)

Intensive commercial culture of channel catfish is currently showing the greatest growth among fish-farming enterprises. About 14,000 acres are now in production and another 6,000 acres are expected to be producing within a year. An anticipated 40 million pounds of catfish may be harvested in the fall and winter of 1967. The 15 million pounds of catfish produced in 1965 was primarily absorbed by live fish markets; about 10 percent was sold to local food markets. These markets, however, have a saturation level. It is important that the catfish producers know the limits, both by total volume and by season, of the present high paying outlets. Fish that cannot be absorbed by these markets will have to be processed, and processing will raise production costs.

A newsletter published by the Bureau of Commercial Fisheries shows the cost of producing and harvesting catfish under certain varying conditions and situations of management. Management practices have not stabilized to the point where sound production costs can be predicted. The cost of producing farm-cultured catfish varies greatly from producer to producer and even from pond to pond in an individual operator's farm. Production costs are affected by the costs of land, construction, labor, water, feed, and such other factors as taxes. Production situations are hypothesized based on a composite of facts gathered from fish farm

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ABSTRACTER: L. Baldwin

9.16 FISH FARMING IN THE UNITED STATES

Corey, Bob et al.
American Fishes and U.S. Trout News 12, No. 2, 26 pp. (July-August 1967)

In this issue of the official publication of the U.S. Trout Farmers Association, the following articles and editorials appear.

Let's Go Fishing...for New Business; First by Eliminating the "Give-Away" Programs.--by Bob Corey. The president of the Trout Farmers Association calls for cooperation between governmental agencies and commercial fish farmers in such projects as the stocking of private ponds and streams, the creation of new markets, and the stocking of public waters. His thesis is that taxpayers' money as well as the fish farmers' business will be saved thereby.

The National Fish Hatchery System.--by A. V. Tunison. This report by the deputy director of the Bureau of Sport Fisheries and Wildlife deals with the emphasis of national hatcheries on fish culture and of state and commercial hatcheries on supplying the fish needed to maintain and improve the country's top participation sport.

Fresh-Water Fish and Fishing.--by Henry A. Regier. This article, which was reprinted from the "Conservationist," deals with the problems of successfully managing the natural wild aquatic community with three different groups of society in

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ABSTRACTER: L. Baldwin

9.19 (*) STUDIES ON ACCUMULATION OF HEAVY METALS IN AQUATIC ORGANISMS. I - ON THE COPPER CONTENTS IN OYSTERS

Ikuta, Kunio (Fac. of Agr., Miyazaki Univ., Miyazaki City, Japan)
Bulletin of the Japanese Society of Scientific Fisheries 33, No. 5, 405-409 (May 1967)

Aquatic organisms absorb and accumulate heavy metals existing in the water of their environment. The study reported here deals with the relation between the accumulation of copper by three species of oyster (Ostrea gigas, O. spinosa, and O. circumpicta) and the proximity of wastewaters discharged from a copper mine.

The oysters were collected from five closely spaced locations along the southern shores of Nobeoka Bay and from five rather widely spaced locations in the waters immediately north of the Bay. Collection dates ranged from January 29, 1965, to March 18, 1965. The following table summarizes the findings.

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mind: the people who like their natural beauty undisturbed, the people who like not only the beauty of nature but the sport of capturing some of its organisms, and the commercial fishermen. Successful management, says this member of the University of Toronto's Department of Zoology, depends on a knowledge of the fish species, the water in which they live, and the related plant and animal life.

Warmwater Pond Fish Help Feed the World.--by H. S. Swingle. Although pond-culture of fish began in the United States as early as 1940, producing such fish for food did not begin until about 1955; nevertheless, the industry is growing rapidly. In Israel, about half the fish consumed are produced in ponds. Dr. Swingle, who is affiliated with Auburn University, summarizes the factors that affect production: proper fertilization of ponds, formula feeding of the fish, genetic breeding and selection of desirable stocks, biological means of increasing the harvest, new systems of fish culture, and recognition and control of diseases and parasites.

Here's an Insight on Taxes for Fish Farmers.--by Charles Files. The president of the American Fish Farmers Federation abstracts a letter from the Commissioner of the Internal Revenue Service explaining what expenses a fish farmer need not charge to his capital account.

Here's the Market Potential for Farm Raised Fish.--by Walter G. Jones. The Marketing Program Coordinator of Region 4, Bureau of Commercial Fisheries, emphasizes the commercial and nutritional value of farm-raised fish, particularly catfish.

Other articles deal with such diverse subjects as fish feeds, electric round-up traps, burping trout that have been transported too soon after feeding, or making a homemade hatching battery out of half-gallon jars.

9.19

Mean value of copper accumulated by oysters

Oyster species	Southern group		Northern group	
	Location of catch	Copper content (mg. cu/kg meat)	Location of catch	Copper content (mg. cu/kg meat)
O. gigas	Myoken	320.2	Urashiro	60.9
	Totoro	434.6		
O. circumpicta	Takachibe	612.9	Furue	93.0
	Akamizu	356.5		
	Kojima	686.8		
O. spinosa			Tenjin	86.9
			Shimanoura	99.4
			Miyanoura	40.0

The author concludes that one of the factors causing the high concentration of copper in the Southern group is the copper-mine waste being discharged into the Bay near Kojima. [11 references]

9.19 EFFECTS OF PAPER FIBERS ON FISH EGGS AND SMALL FISH

Smith, Lloyd L., Jr., and Robert H. Kramer (Univ. of Minnesota, St. Paul)
Chemical Abstracts 66, No. 3, 9088k (January 16, 1967)

9.15

determine compliance with tolerance, and the data showed that for each of the last 3 years almost half the lots examined contained residues, mostly below tolerance levels, and that over half these lots contained more than one residue. There is a definite increase in the daily intake of chlorinated organic compounds. Continued surveillance and attention to pesticide residues in foods are necessary. [14 references]

9.15 IRON-55 IN MARINE ENVIRONMENT AND IN PEOPLE WHO EAT OCEAN FISH

Palmer, H. E., and T. M. Beasley (Battelle Memorial Institute, Pacific Northwest Laboratory, Richland, Washington), and T. R. Folsom (Scripps Institution of Oceanography, La Jolla, California)
Nature 211, No. 5055, 1253-1254 (September 17, 1966)

The iron 55 content in various populations of the world is currently being measured. During the course of the investigations, it was found that ocean fish have higher concentrations of iron 55 than Alaskan caribou do. The conclusion is that people who eat large quantities of ocean fish, such as the Japanese and the Scandinavians, could have body burdens of iron 55 several times higher than those of the caribou-eating Eskimos. This article describes the measurements that were made on samples from the marine environment, and includes estimates of the body burdens of iron 55 of individuals whose diet includes a large proportion of fish. [Abstracter: M. F. Tripple]

9.16

operations, research, assumptions, and projections. The intent is that the information will provide a framework within which a producer can fit his own operations and thereby arrive at an estimate of production costs.

Among the production costs that must be considered by the catfish raiser are those for wells, total water, fingerling stock, and feed. A table is presented of the annual production cost of channel catfish at various yields per acre. The table is based on assumed figures for the production cost factors previously mentioned, and also includes figures for harvesting costs, labor, chemical treatment, equipment depreciation, maintenance, interest on investment, and initial capital expense.

The newsletter includes a theoretical pricing chart for estimating the retail price per pound of dressed catfish. The chart shows producer costs at 25¢ per pound with an additional 5¢ for profit. Transportation costs, which are borne by the processor, add 3¢ per pound to the price. The actual cost to the processor for dressed fish averaging 60 percent yield is 55¢; to this is added 10¢ for processing and 5¢ for profit. A 20¢ markup for distribution, storage, and profit for the wholesaler is added to the 70¢ per pound cost. This total of 87½¢, plus an additional 20 percent markup for the retailer, brings the final retail price for catfish to $1.09 per pound.

0.118 PROTOTYPE AUTOMATIC FISH-BONE DETECTOR
(*)
Moran, James M., Donald P. Wise, Ray Tetrault, and Joseph H. Carver
Food Technology 19, 46-51 (May 1965)

(Abstract of this article appears under 7.89 page 17 - March 1966)

*Items on back of card.

0.118 RAPID FREEZING OF LIQUIDS BY COLLIDING JETS

Sangster, Maarten (Rijksuniv., Utrecht, Neth.)
Chemical Abstracts 63, 3294b (August 2, 1965)

3.14 PROCESS FOR IMPROVING ANIMAL OR FISH MEAT PRODUCT
(*)
British Patent 1,045,046
Journal of the Science of Food and Agriculture 18, No. 8, 11-69 (August 1967)

The flavor of a product made of ground fish can be improved by treating the product with either a 5'-nucleotide or an alkali metal, ammonium, or amine salt and at least one of the following acids: metaphosphoric, pyrophosphoric, citric, succinic, fumaric, tartaric, maleic, thiodipropionic, or a polyphosphoric acid. The nucleotide and the acid are kneaded together into the product, or the product is brushed simultaneously with the nucleotide and a solution of the acid.
[Abstracter: L. Baldwin]

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2.41 LINED CARTONS FOR TRANSPORTING FISH
(*)
Anonymous
Fishing News International 6, No. 1, 62 (January 1967)

A Boston firm is manufacturing a new type of container for efficient and economic shipping of fish and shellfish by land, sea, or air. The expandable polystyrene cases consist of a foam plastic liner in a corrugated carton. The manufacturer claims that the container has a high strength-to-weight ratio and excellent thermal insulation, is chemically inert and shock absorbant, and retains moisture well. The containers are said to reduce packaging costs, eliminate shipping damage, and be light in weight for shipping purposes.

Three sizes of foam plastic-liner boxes are being manufactured. A 20 x 12 x 4-inch liner is designed for transporting fresh fillets. Three of these liners packed in a corrugated carton weigh 5-3/4 pounds. A 21 x 13 x 14-in. liner for shipping lobsters, shellfish, and bulk packs of fish fillets weighs 4-3/4 lb. A jumbo liner measuring 21 x 14 x 16 in. and weighing 5-3/4 lb. is designed to carry 60 lb. of live lobsters. The jumbo liners can be nested for easy storage.

The manufacturer also makes a reusable ice pack consisting of 1½ or 3 lb. of freezable chemical gel in a polyethylene bag. The ice pack is used in conjunction with fresh seaweed to keep lobsters in top condition in the jumbo container. The manufacturer claims that the refrigerating properties of the cold packs are five times that of an equal weight of ice and that the packs are cleaner and more convenient to use, and are reusable. [Abstracter: E. R. Weissman]

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7.51 AN IMPROVED METHOD FOR THE DETERMINATION OF ORTHOPHOSPHATE SUITABLE FOR ASSAY OF ADENOSINE TRIPHOSPHATASE ACTIVITY
(*)
Mozersky, Samuel M., Julio D. Pettinati, and Stanley D. Kolman (Eastern Regional Research Laboratory, U.S. Department of Agriculture, Philadelphia, Pennsylvania 19118)
Analytical Chemistry 38, 1182-1187 (August 1966)

Because of the poor recovery and lack of reproducibility and stability frequently experienced in the assay of orthophosphate (Pi), the method of Martin and Doty has been modified in three respects: (1) the protein is precipitated with ClO_4^- at pH 1.5-1.8; (2) the precipitate is removed before the phosphomolybdic acid is formed; and (3) the phosphomolybdic acid is measured after extraction into isobutanol-benzene (1:1) in the unreduced (yellow) form. The optimal concentrations of H_2SO_4 and molybdate have been determined. The new method is considered superior in precision and accuracy, as well as sensitivity, to methods previously available. The product measured is stable for at least 48 hr. The procedure can be applied to the determination of the adenosine triphosphatase activity of extracts of muscle tissue and proteins isolated from such tissue. [27 references.]
[Abstracter: M. F. Tripple]

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2.41 POLYSTYRENE FISH BOXES

Anonymous
Norwegian Fishing and Maritime News 13, No. 2, 45 (1966)

A Norwegian firm is manufacturing fish boxes from a polystyrene foam that is specifically designed for this purpose. The polystyrene is composed of closed foam plastic cells, which do not absorb moisture, and which give the boxes excellent insulating properties against heat and cold. The polystyrene foam is extremely light--a box of 35-liter capacity weighs about 1 pound. The light weight makes the containers suitable for use in air freight shipments and should make export by air a profitable business. The boxes have already been used to transport trout and oysters from Norway to the Continent, and the condition of the goods on arrival is very good. [Abstracter: E. R. Weissman]

7.51 PHOTOMETRIC METHOD FOR QUANTITATIVE DETERMINATION OF HEMOGLOBIN IN FISH BLOOD

Luk'yanenko, V. I., and P. P. Geraskin
Chemical Abstracts 65, 15781a (November 7, 1966)

7.51 SERUM HIGH-DENSITY LIPOPROTEIN: EFFECT OF CHANGE IN STRUCTURE ON ACTIVITY OF CHICKEN ADIPOSE TISSUE LIPASE

Scanu, A. (Department of Medicine and Biochemistry, University of Chicago, Chicago, Illinois)
Science 153, 640-641 (August 5, 1966)

The high-density lipoprotein in human serum was analyzed as a possible activator for a lipoprotein lipase isolated from chicken adipose tissue. The activating capacity was lost when the lipoprotein was extracted with a mixture of ethanol and ethyl ether (3:2 v/v) at -10° C. The activating capacity was restored when the extracted protein was incubated with aqueous sols of either whole phospholipids or the lecithin fraction prepared from the high-density lipoprotein. Because the phospholipid sols alone were ineffective as substrate activators, the complex that forms when the extracted lipoprotein is incubated with phospholipids appears to be necessary for lipoprotein lipase activity. [8 references.] [Abstracter: M. F. Tripple]

2.43 METHOD FOR DETERMINING THE BACTERIAL PERMEABILITY OF PLASTIC FILMS

Ronsivalli, Louis J., Julius B. Bernstein, and Burton L. Tinker
Food Technology 20, No. 8, 98-99 (August 1966)

(Abstract of this article appears under 3.2382 page 9 - April 1967)

0.116 SOME NEW DEVELOPMENTS IN LIQUID CHROMATOGRAPHY

James, A. T., R. P. W. Scott, and J. R. Ravenhill (Unilever Res. Lab. Sharnbrook, Bedford, England)
J. Ass. Off. Agric. Chem. 48, No. 1, 78-86 (1965)
Analytical Abstracts 13, Abstract No. 3291 (June 1966)

The advantages and disadvantages of instruments available for use in liquid and gas chromatography are listed, and the techniques applicable to liquid chromatography are reviewed. A general-purpose device for liquid chromatography should include (1) a temperature-controlled column oven that will operate between -10° and +100°, (2) a liquid pump that will operate over the range between 0.5 and 25 ml. per min., (3) a highly sensitive solute detector, and (4) a fraction collector that is actuated by the detector signal. [18 references] [Abstracter: M. F. Tripple]

0.116 APPARATUS FOR THE RAPID PREPARATION OF FATTY ACID ESTERS FROM LIPIDS FOR GAS CHROMATOGRAPHIC ANALYSIS

Endres, J. G. (Armour Food Res., Oak Brook, Illinois)
Chemical Abstracts 66, No. 6, 20216r (February 6, 1967)

3.14 THE EFFECT ON FISH SAUSAGE PRESERVATION OF ACIDIFICATION BY THE ADDITION OF LACTONE

Okada, Minoru, and Hisaya Takesue (Tokai Regional Fisheries Res. Lab., Tokyo, Japan)
Chemical Abstracts 67, No. 1, 2165q (July 3, 1967)

3.14 PRESERVATION OF SALMON CAVIAR

Nasedkina, E. A., and A. M. Teplitskaya
Chemical Abstracts 67, No. 5, 20730z (July 31, 1967)

3.14 INFLUENCE OF LACTONES ON THE PRESERVATIVE EFFECTS OF FURYLFURAMIDE AND SORBIC ACID ON FISH SAUSAGE

Okada, Minoru, Motonobu Yokoseki, and Kyoji Takahata (Tokai Fisheries Res. Inst., Tokyo, Japan)
Chemical Abstracts 65, 15979a (November 7, 1966)

7.51 (*) DETECTION OF SULPHUR, ORGANIC DISULPHIDES AND SOME OTHER COMPOUNDS ON PAPER CHROMATOGRAMS BY MEANS OF HYDROGEN SELENIDE

Wroński, M. (Department of Chemical Technology, University of Lodz, Nowotki 18, Poland)
Journal of Chromatography 24, No. 2, 480-481 (October 1966)

Hydrogen selenide is a rather strong reducing agent, and the free energy change accompanying its reaction with different substances may be used for the detection of various reducible compounds on paper chromatograms. According to the amount of selenium that separates, various colored spots are produced in decreasing order of concentration. By comparison with the color intensities of spots prepared from solutions of known concentrations, a semiquantitative evaluation is possible. [Abstracter: M. F. Tripple]

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9.13 (*) SERUM OSMOLALITY IN THE COELACANTH, LATIMERIA CHALUMNAE: UREA RETENTION AND ION REGULATION

Pickford, Grace E., and F. Blake Grant (Bingham Laboratory, Department of Biology, Yale University, New Haven, Connecticut 06520)
Science 155, No. 3762, 568-570 (February 3, 1967)

By the use of hemolyzed blood samples from a thawed specimen of Latimeria chalumnae, it was determined that this coelacanth uses high concentrations of urea to maintain its serum osmolality at about the osmolality of sea water. The mean value of the total serum osmolality was 1,181 milliosmoles per liter; mean value of urea concentration was 335 millimoles per liter; and mean value of nonprotein nitrogen was 1,343 milligrams percent. Blood from the heart showed much lower values for osmolality (921 milliosmoles per liter) and nonprotein nitrogen (1,030 mg. percent) and probably was less severely contaminated with products of protein breakdown. The mean values (milliequivalents per liter) of the ions were sodium, 181; potassium, 51.3; calcium, 6.9; magnesium, 28.7; chloride, 199; and bicarbonate, 4.7. Fluid from the anterior chamber of the eye gave values of 952 milliosmole per liter; urea value for this fluid was 303 mmole. per liter; and the magnesium was 7.3 meq. per liter. The magnesium value of the aqueous humor of the eye was used to correct the abnormally high concentrations of magnesium in the hemolyzed serum. The high level of potassium in the serum was also attributed to hemolysis. [20 references] [Abstracter: M. M. Gwin]

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7.53 (*) RAPID GAS-LIQUID CHROMATOGRAPHIC PROCEDURE FOR THE ANALYSIS OF METHYL ESTERS OF LONG CHAIN FATTY ACIDS

Jellum, M. D., and R. E. Worthington (Departments of Agronomy and Chemistry, Georgia Experiment Station, Experiment, Georgia)
Journal of the American Oil Chemists' Society 43, No. 12, 661-664 (December 1966)

This study determines the effects of (1) column temperature and (2) the flow rate of the carrier's gas on the precision and accuracy of gas-liquid chromatographic (GLC) analyses of the fatty acids of oils from corn, sorghum, soybean, and cotton seed. The GLC procedure tested permits rapid analysis of the major fatty acids commonly found in vegetable oils and is both precise and accurate. [11 references] [Abstracter: F. Bruce Sanford]

*Items on back of card.

9.19 (*) POLLUTION, WEATHER, ESTUARIES FOCUS OF COMMISSION RESEARCH

Servizi, James
Western Fisheries 73, No. 3, 16, 18 (December 1966)

Scientists from the International Pacific Salmon Fisheries Commission and the Canadian Department of Fisheries have been observing the effects of pulp mill wastes on salmon in the Fraser River. They report that the mills, using waste-treatment methods approved by the Department of Fisheries, have been handling their waste products in a manner that has allowed all fish to pass the mills in good condition.

Also under observation is the stress caused in salmon by pollutants in sublethal concentrations. A method of measuring pressure changes in the mouth of the fish as it breathes is thought to offer a tool for the study of stress. The scientists believe that the pressure changes in the mouth will indicate internal stress caused by toxicants. [Abstracter: E. R. Weissman]

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ORGANIC ANALYSIS

ORGANIC ANALYSIS

BIOCHEMISTRY OF FISH

POLLUTION

9.13 UREA SYNTHESIS IN THE LUNGFISH: RELATIVE IMPORTANCE OF PURINE AND ORNITHINE CYCLE PATHWAYS

Forster, R. P. (Department of Biological Sciences, Dartmouth College, Hanover, New Hampshire 03755), and Leon Goldstein (Department of Physiology, Harvard Medical School, Boston, Massachusetts)
Science 153, No. 3744, 1650-1652 (September 30, 1966)

The relative importance of the purine pathway (uricolysis) and the ornithine cycle as routes for urea synthesis was studied in liver preparations made from the African lungfish (Protopterus dolloi). The incorporation of C^{14}-labeled precursors into urea was used for the comparison. Both pathways were found to be present in the lungfish; however, the ornithine cycle was quantitatively more important. [16 references] [Abstracter: M. F. Tripple]

9.13 URICOLYTIC ENZYMES IN LIVER OF THE DIPNOAN PROTOPTERUS AETHIOPICUS

Brown, G. W., Jr., Jesse James, Ralph J. Henderson, Walter N. Thomas, Robert O. Robinson, Arthur L. Thompson, Earlene Brown, and Susan G. Brown (Department of Biochemistry, University of Texas Medical Branch, Galveston 77550)
Science 153, No. 3744, 1653-1654 (September 30, 1966)

The enzymes uricase, allantoinase, and allantoicase were measured in liver preparations isolated from the African lungfish (Protopterus aethiopicus). The levels of these enzymes in lungfish liver suggested that the amount of urea formed in vivo in the lungfish via a uricolytic pathway may be greater than that formed via the ornithine-urea cycle. The operation of a "purine cycle" in the lungfish liver is suggested by the authors. [21 references] [Abstracter: M. F. Tripple]

7.51 ACTIN-MYOSIN INTERACTION: INHIBITION OF THE MYOSIN ADENOSINE TRIPHOSPHATASE BY ACTIN

Barron, S., E. Eisenberg, and C. Moos (Department of Biophysics, State University of New York, Buffalo)
Science 151, No. 3717, 1541-1542 (March 25, 1966)

The addition of actin to myosin, in the absence of magnesium ion, in a 1:4 ratio has a strong inhibitory effect on the adenosine triphosphatase activity. This effect contrasts with the well-known activating effect of actin in the presence of magnesium ion. Both effects may be the result of a conformational change in the active site of the myosin adenosine triphosphatase. [16 references.]
[Abstracter: M. F. Tripple]

7.51 RIBONUCLEIC ACIDS FRACTIONATION BY DENSITY-GRADIENT CENTRIFUGATION AND BY AGAR GEL ELECTROPHORESIS: A COMPARISON

Hadjiolov, A. A., P. V. Venkov, and R. G. Tsanev (Biochemical Research Laboratory, Bulgarian Academy of Sciences, Sofia, Bulgaria)
Analytical Biochemistry 17, No. 2, 263-267 (November 1966)

The pattern of ribonucleic acid (RNA) fractionation obtained with agar gel electrophoresis was analogous to that obtained by sucrose density-gradient centrifugation. An almost linear relation between electrophoretic mobility and sedimentation coefficient was established with different preparations of RNA. As shown by agar gel electrophoresis, RNA fractions obtained by singlerun sucrose density-gradient centrifugation were contaminated by the lighter fraction.
[Abstracter: M. F. Tripple]

9.19 CONTAMINATION OF FRESH WATER BY PERSISTENT INSECTICIDES AND THEIR EFFECTS ON FISH

Holden, A. V.
Chemical Abstracts 63, 13920e (November 8, 1965)

9.19 ACCUMULATION OF ZINC-65 FROM PROLONGED CONSUMPTION OF COLUMBIA RIVER FISH

Foster, R. F., and J. F. Honstead (Battelle Mem. Inst., Richland, Washington)
Chemical Abstracts 66, No. 11, 44114g (March 13, 1967)

9.19 CHROMIUM-51 IN SEAWATER: CHEMISTRY

Cutshall, Norman, Vernon Johnson, Charles Osterberg (Department of Oceanography, Oregon State University, Corvallis)
Science 152, 202-203 (April 8, 1966)

Chromium 51 entering the Pacific Ocean by way of the Columbia River from nuclear reactors upstream remains in the hexavalent state. This radionuclide in the sea water can best be analyzed by hydroxide coprecipitation with iron when the chromium 51 is first reduced to the trivalent state. [Abstracter: M. F. Tripple]

7.53 RAPID METHOD FOR DETERMINATION OF MOISTURE IN FISH PRODUCTS

Levi'eva, L. S.
Rybnoe Khoziaistvo 32, No. 1, 37 (1956) (In Russian)
World Fisheries Abstracts 15, No. 4, 45 (October-December 1964)

An aluminum dish containing about 10 g. of ignited sand and from 1.7 to 2.0 g. of the fish product was placed in the middle of the light cone from a 250-watt infrared lamp. It was kept there for 8 min., cooled in a desiccator, and weighed. The results indicate that the method is satisfactory for determining the amount of moisture in both smoked and salted fish. Results vary only ±0.5 percent from those obtained by standard methods. [Extractor: L. Baldwin]

7.53 DETECTION OF MARINE ANIMAL OILS IN EDIBLE FATS

Franzke, C., K. O. Helms, W. Stizki, and S. Sperrau
Nahrung 9, 691-700 (1965)
Journal of the Science of Food and Agriculture 17, 1146-1147 (July 1966)

Examination of available methods for detecting the presence of marine-animal oils in fats led the authors to conclude that: (1) color reactions and results from thin-layer chromatography are not adequately specific; (2) methods based on an examination of the bromine addition products of the glycerides or the fatty acids (Bisenschleme et al., 1910), or on spectrophotometric methods (Franzke, 1964) are specific and reliable. [17 references.] [Abstracter: L. Baldwin]

0.117 VACUUM DISTILLATION FOR THE RECOVERY OF SAMPLES FOLLOWING THIN-LAYER CHROMATOGRAPHY

Blume, Philip (Laboratory of Technical Development, National Heart Institute, Bethesda, Maryland 20014)
Analytical Biochemistry 16, No. 2, 372-375 (August 1966)

Following the separation of a mixture by thin-layer chromatography (TLC), it is often necessary to recover one or more of the isolated components. The authors report the results of some preliminary tests of a method based upon the vacuum distillation of the desired substances directly from the TLC material. This method can be used only with compounds that can be distilled at temperatures within the working range of the TLC support material. [Abstracter: F. Bruce Sanford]

0.117 A SIMPLE LIQUID-LIQUID EXTRACTION APPARATUS

Doerling, C. H., and H. Tarver (Department of Biochemistry, University of California School of Medicine, San Francisco 94122)
Analytical Biochemistry 9, 498-500 (December 1964)

0.117 AN INEXPENSIVE CONTINUOUS LIQUID-LIQUID EXTRACTOR

Butler, Thorne J. (U.S. Air Force Hosp., Tachikawa, Japan)
Chemical Abstracts 61, 12300e (November 9, 1964)

2.01 STUDIES ON THE TRUE FUNGI IN PROCESSED SEA FOODS
1. YEASTS IN PROCESSED SEA FOODS

Shinano, Haruo, and Minoru Sakai
Bulletin of the Faculty of Fisheries Hokkaido University 18, No. 1, 37-50 (May 1967) (In Japanese; English Abstract)

A study of the distribution of yeast in 45 samples of processed seafoods yielded the following data:

1. 248 strains of yeast were isolated from 37 of the 45 samples examined; 226 of the strains were identified by the classification method of Lodder and van Riij (1952); the other 22 could not be classified by this method.

2. The strains could be grouped into 19 species belonging to 9 genera; namely, Saccharomyces, Hansenula, Debaryomyces, Schwanyomyces, Candida, Torulopsis, Trichosporon, Rhodotorula, and Cryptococcus. Saccharomyces mellis, S. rouxii, Debaryomyces kloeckeri, Candida melibiosi, and their ilk contained the highest percentage of the strains.

3. Preserved foods boiled in soy and sugar contained the most yeasts; the osmophilic yeasts Saccharomyces mellis and S. rouxii and the salt-tolerant yeasts Debaryomyces kloeckeri and Candida melibiosi were most abundant.

4. In fermented, dried, and smoked seafoods, results were insignificant except that the distribution of asporogenous yeasts was more widespread than the distribution of sporogenous yeasts. [Abstracter: L. Baldwin]

0.39 DENATURATION OF PROTEINS BY FATTY ACIDS

Bull, Henry B., and Keith Breese (Department of Biochemistry, University of Iowa, Iowa City 52240)
Archives of Biochemistry and Biophysics 120, No. 2, 309-315 (May 1967)

Low concentrations of fatty acid anions in the neutral pH range have a marked stabilizing effect on bovine serum albumin. Maximum stabilization has been seen with the anions of heptanoic and caprylic acids. The authors have observed that the fatty acids themselves are powerful denaturants of egg albumin in the pH range of acid.

Their experiments have demonstrated that the effectiveness of fatty acids as denaturants increases as the length of the carbon chain increases. The extent of denaturation is measured by the solubility of the protein at or near its isoelectric point in the presence of Na_2SO_4. The degree of denaturation depends on pH, acid concentration, and other factors. The rate of denaturation follows first order kinetics in respect to the protein; however, the order in respect to the fatty acid is much higher. The energy of activation is about 33,000 calories per mole in the presence of acetic acid. It is necessary to bind about 10 moles of the fatty acid per mole of protein before denaturation can begin. Denaturation is accompanied by a significant increase in the viscosity of the protein solution, and by the appearance of opalescence and gelation. The tendency of the reaction mixture to gel is greatly increased by 0.05 M KCl. [Abstracter: M. F. Tripple]

3.2349 FREEZE-DRYING OF EEL BROODS

Cañizares, J., B. Lafuente, E. Primo, and F. Piñaga
Revta Agroquím. Technol. Aliment. 6, 237-244 (1966)
Journal of the Science of Food and Agriculture 18, No. 1, 1-39 (January 1967)

Eel broods, which were freeze dried without treatment or after dipping in a 5-percent solution of sodium hexametaphosphate, were of better initial quality than broods freeze-dried after blanching at 90° C. in a 10-percent salt solution. However, the rate of browning during storage was greatly increased in the unblanched eel broods. The development of rancidity was retarded by the hexametaphosphate treatment and by storage under N_2, but in all cases beginning rancidity was revealed organoleptically after 2 months of storage.
[Abstracter: M. M. Gwin]

3.2345 ASHRAE TECHNICAL COMMITTEE REPORTS ON CRYOGENICS RESEARCH

Johnson, Victor J.
ASHRAE Journal 8, No. 9, 68-69 (September 1966)

Cryogenics refers to the area of technology covering the temperature range from about -250° F. to absolute zero. This report covers potential research projects and reviews the current availability and uses of the cryogens.
[Abstracter: M. F. Tripple]

AUTHOR INDEX - MARCH 1968

4.91 N-CYCLOHEXYL LINOLEAMIDE: METABOLISM AND CHOLESTEROL-LOWERING EFFECT IN RATS

Nakatani, Hiroshi, Hideaki Fukushima, Atsushi Wakimura (Pharmaceuticals Division, Sumitomo Chemical Co., Ltd., Kasugade-cho, Konohana-ku, Osaka, Japan), and Michio Endo (Takarazuka Radiation Laboratory, Sumitomo Atomic Energy Industries, Ltd., Suenari, Kurando, Takarazuka, Japan)
Science 153, 1267-1269 (September 9, 1966)

More than 50 percent of the orally administered N-cyclohexyl linoleamide-carboxyl-C^{14} was recovered from the feces of rats. From 30 to 50 percent of the absorbed carbon-14 activity was excreted in the urine. The N-cyclohexyl linoleamide had an inhibitory effect on the absorption of cholesterol from the thoracic duct. It also caused a decrease in the deposition of cholesterol in the livers of rats that had been fed cholesterol. [Abstracter: M. F. Tripple]

4.91 FATTY ACID COMPOSITION OF DEPOT FAT, IN RELATION TO HIGH FISH CONSUMPTION IN JAPAN

Imaichi, Kunitaro, Kaoru Oyama, Junichi Fukuda, Mutsuko Yamazaki, and Tomiko Hirose (Fujikoshi Hosp., Toyama, Japan)
Chemical Abstracts 64, 18105g (June 6, 1966)

7.522 AN ACCELERATED SINGLE-COLUMN PROCEDURE FOR THE AUTOMATIC ANALYSIS OF AMINO ACIDS IN COLLAGEN AND ELASTIN HYDROLYZATES

Miller, E. J., and L. A. Piez (National Institute of Dental Research, National Institutes of Health, Bethesda, Maryland)
Analytical Biochemistry 16, No. 2, 320-326 (August 1966)

The need for rapid amino-acid analysis lead to the development of an accelerated single-column procedure for the automatic analysis of the amino acids in the complex hydrolyzates of collagen and elastin. A modification of the starting buffer is described that eliminates the baseline drift associated with the changing composition of the column effluent. The automated procedure permits three complete amino-acid analyses of collagen or elastin hydrolyzates to be made in a working day. [7 references] [Abstracter: F. Bruce Sanford]

7.525 DETERMINATION OF THE CONTENT OF TRYPTOPHAN IN MUSCLE TISSUES

Kryłova, N., and G. Solntseva
Chemical Abstracts 63, 7335h (September 13, 1965)

7.520 COLORIMETRIC ESTIMATION OF AMINO ACIDS AND PEPTIDES WITH THE FOLIN PHENOL REAGENT

Matsushita, Setsuro, Nobuko Iwami, and Yuki Nitta (Research Institute for Food Science, Kyoto University, Kyoto, Japan)
Analytical Biochemistry 16, No. 2, 365-371 (August 1966)

Amino acids--other than tyrosine, tryptophan, and cysteine--can react with the phenol reagent when divalent cobalt ions coexist. This paper discusses the possibility that the reaction can be applied to the quantitative determination of amino acids and peptides.

By the use of the reaction of amino acids and peptides with Folin phenol reagent to produce a blue color when divalent cobalt ions coexist, a new colorimetric assay method of these substances was made possible. However, the color formed was not strictly proportional to concentrations, so standard curves may be needed. Some other nitrogenous substances that can form chelates with divalent cobalt ions also reacted with the reagent, but ammonia or urea did not inferfere.
[Abstracter: F. Bruce Sanford]

7.520 PHYSICAL AND BIOLOGICAL STUDIES OF CRAB DEOXYRIBONUCLEIC ACID

Widholm, Jack Milton (California Inst. of Technol., Pasadena)
Chemical Abstracts 64, 20282b (June 20, 1966)

7.879 A GAS CHROMATOGRAPHIC METHOD FOR MEASURING RANCIDITY IN VEGETABLE OILS

Scholz, R. G., and L. R. Ptak
Journal of the American Oil Chemists' Society 43, No. 10, 596-599 (October 1966)

A gas chromatographic procedure has been developed for measuring the degree of rancidity in cottonseed oil and other vegetable oils. The procedure uses an internal standard for quantitating the amount of n-pentane in the oil sample and relates this quantity to organoleptic tests. The precision of the method is good, and the results correlate well with organoleptic tests. The procedure is sensitive to detection and quantitation of oxidative changes in oils. The use of the procedure minimizes manipulation of the sample and thereby avoids alteration of the rancidification products or the state of oxidation. [26 references]
[Abstracter: M. F. Tripple]

7.872 QUALITY INDEX OF FOOD SPERM OIL

Rzhavskaya, F. M.
Chemical Abstracts 65, 17605g (November 21, 1966)

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